Field identification of the 50 most common plant families in temperate regions

(including agricultural, horticultural, and wild species)

by Lena Struwe

struwe@aesop.rutgers.edu

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Note: Listed characteristics are the most common characteristics, there might be exceptions in rare species. This compendium is available for download without cost at http://www.rci.rutgers.edu/~struwe/ . Please send corrections and additions to the author.

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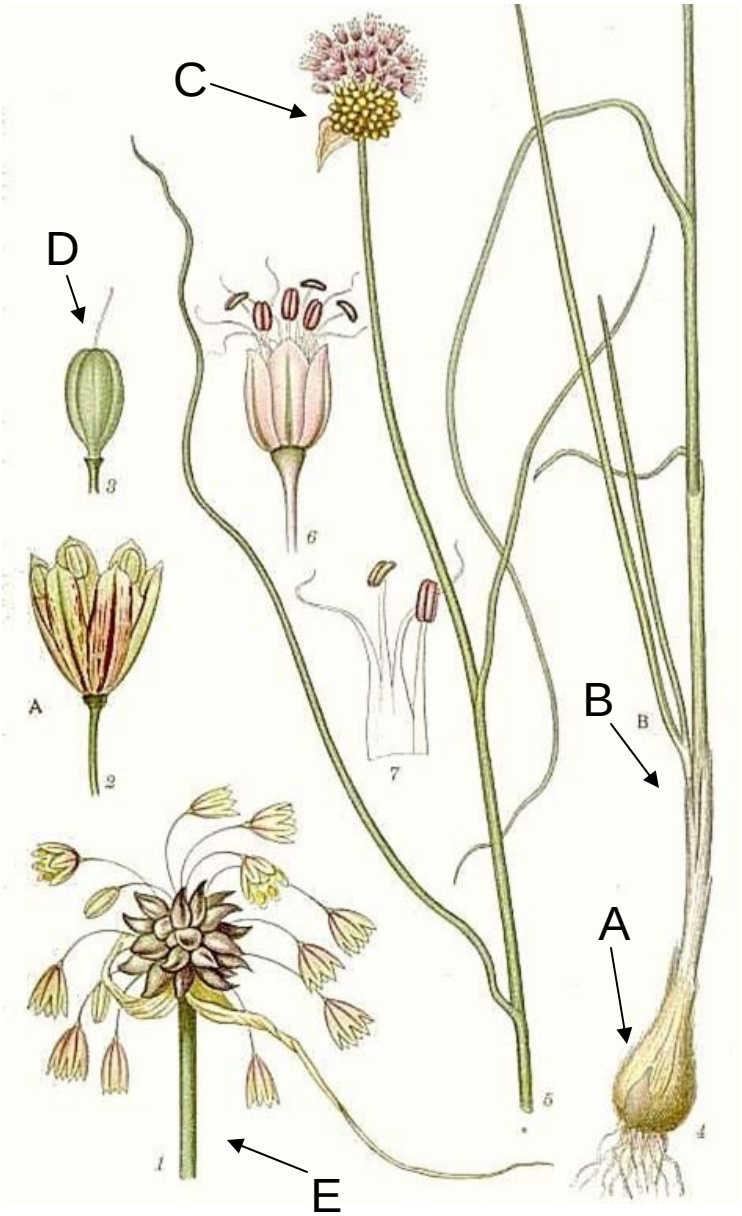
IT

Alliaceae
ONION FAMILY

- Biennial or perennial herbs
- Often with bulb (**A**) at base, surrounded by dry leaves (**A**)
- Onion-like smell
- Simple, narrow leaves in basal rosette (**B**)
- Inflorescence a terminal umbel (**C**), sometimes with bulblets
- Tepals 6, anthers 6
- Ovary superior (**D**), 3-carpellate
- Fruit a capsule
- Seeds hard, dark (covered with phytomelans)



Allium

Examples: garlic, onion, leek, chives (*Allium*).

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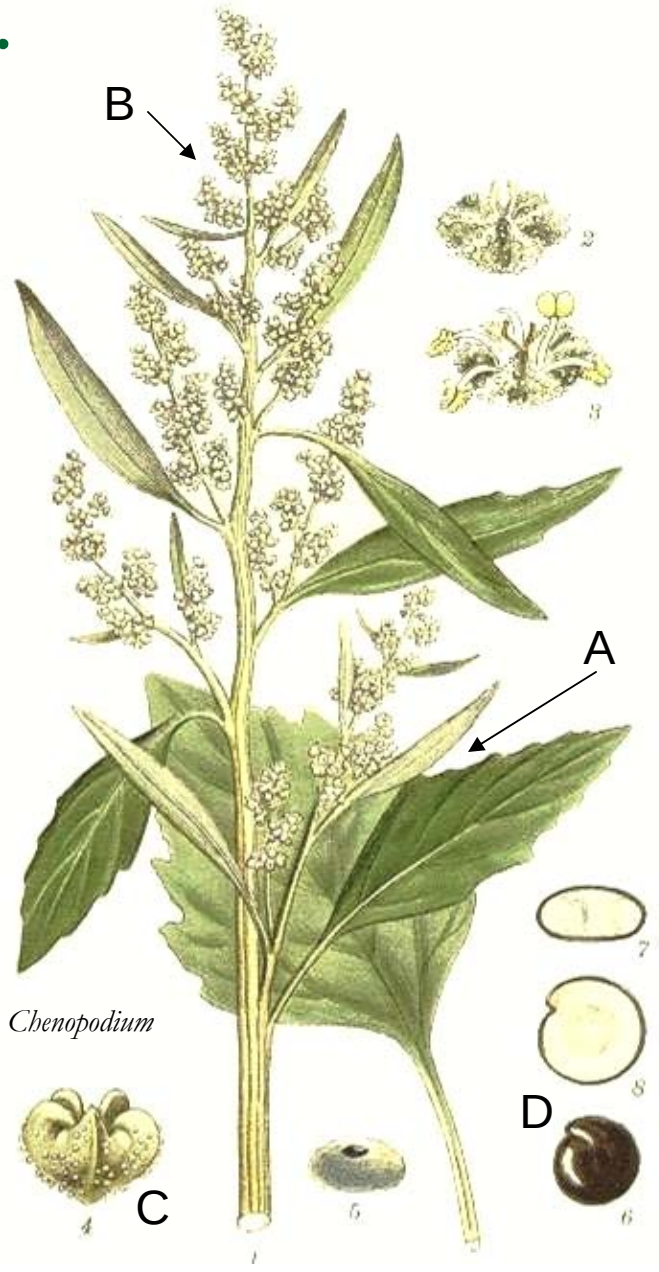
Amaranthaceae s. lat. AMARANTH FAMILY

- Herbs or shrubs (rarely trees or vines), often reddish, many salt-loving plants (halophytes)
- Stems often succulent, and/or jointed
- Leaves alternate, simple (**A**)
- No stipules
- Flowers small, actinomorphic (**B**)
- Sepals usually 3-5, free or fused basally, surrounding the fruit (**C**)
- Petals absent
- Stamens as many as sepals, positioned on the inside of each sepal
- Ovary superior or half-inferior, 1-3 fused carpels, one locule and one ovule, basal placentation
- Fruit a berry, capsule, or nutlet
- Seeds strongly curved (**D**)



Note: Chenopodiaceae is now included in Amaranthaceae.

Examples: beet (*Beta*), amaranth, quinoa (*Amaranthus*), lamb's quarters (*Chenopodium*), spinach (*Spinacia*), cock's comb (*Celosia*).

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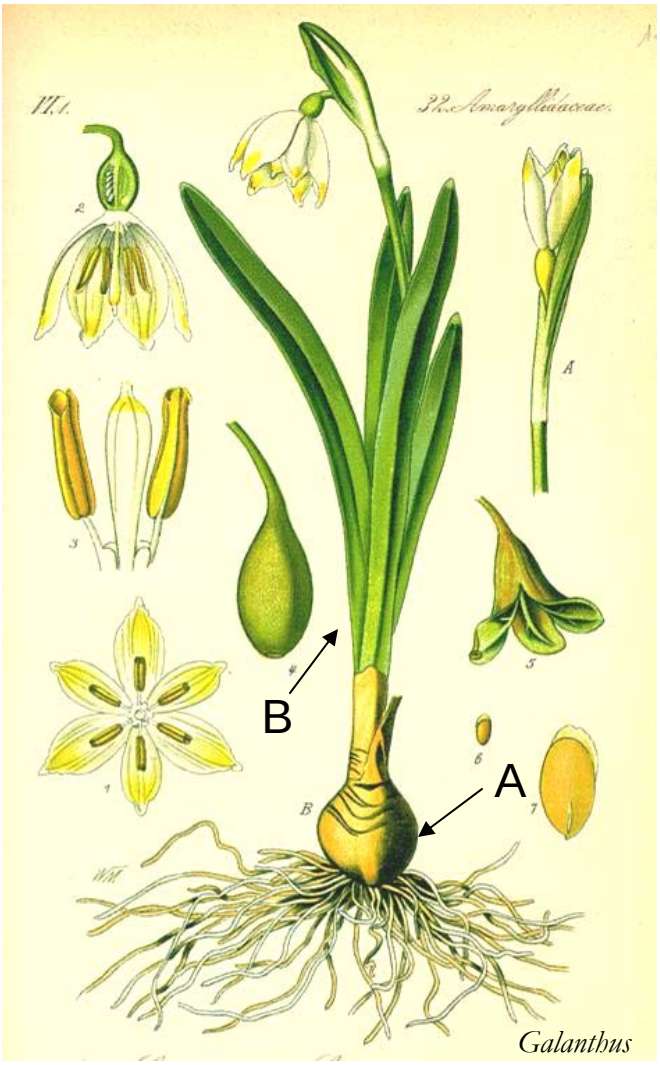
Amaryllidaceae AMARYLLIS FAMILY

- Herbaceous, perennial monocots
- Stem with bulb (**A**) at base
- Leaves linear, often grass-like, with parallel veins (**B**)
- Inflorescence an umbel
- Tepals 6, anthers 6
- Hypanthium (fused tepals and base of stamens) often present
- Ovary inferior, 3-carpellate
- Fruit usually a capsule
- Seeds often black, many



Examples: amaryllis (*Hippeastrum*), snowdrop (*Galanthus*), belladonna-lily (*Amaryllis*), spider lily (*Lycoris, Hymenocallis*), daffodil (*Narcissus*), clivia (*Clivia*), swamp lily (*Crinum*),.spring snowflake (*Leucojum*), Aztec lily (*Sprekelia*), zephyr lily (*Zephyranthes*).

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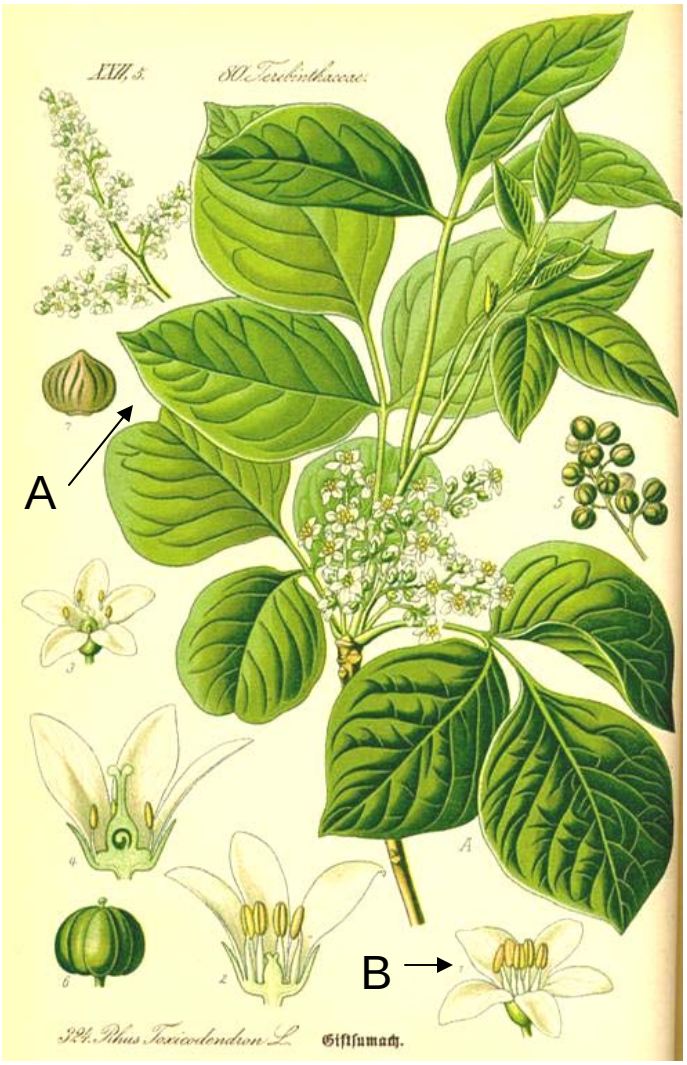
Anacardiaceae CASHEW FAMILY

- Trees, shrub, lianas, or perennial herbs
- With resin ducts and laticifers (sap often toxic)
- Often pinnately compound leaves (**A**)
- Flowers 5-merous, small, with nectary disc (**B**)
- Stamens 5 or 10 (**B**)
- One ovule per carpel, 1-5 carpels in a fruit
- Fruit a drupe



Toxicodendron

Examples: cashew (*Anacardium*), sumac (*Rhus*), poison ivy and poison oak (*Toxicodendron*), pistachio (*Pistacia*), mango (*Mangifera*), pink peppercorn tree (*Schinus*).

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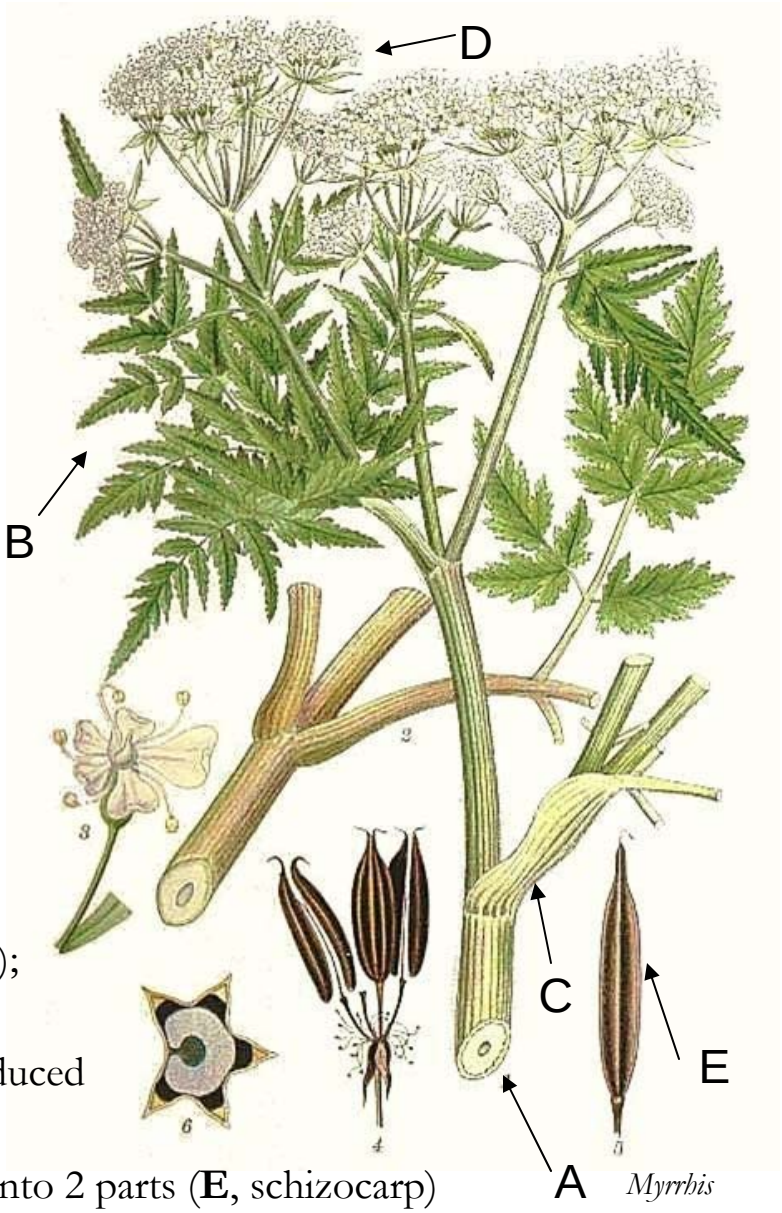
Apiaceae s. lat. CARROT and GINSENG FAMILY



- Mostly herbaceous
- Aromatic, some very poisonous (oils, resins)
- Stems hollow (**A**)
- Leaves alternate, often dissected or lobed (**B**), pinnate venation
- Leaf petiole broadened with sheath (**C**) surrounding stem or base of leaf
- Flowers arranged in umbels or double umbels (**D**); small, white or yellow, many
- Petals 5, not fused, sepals reduced or absent
- Fruit a dry fruit that divides into 2 parts (**E**, schizocarp)

Notes: Apiaceae now includes Araliaceae, and these characters only work well for the temperate herbaceous Apiaceae, not all genera in the family. Some members of the former Araliaceae have berries, simple umbels, and simple leaves without a sheath.

Examples: parsley (*Petroselinum*), dill (*Anethum*), hemlock (*Conium*), cilantro (*Coriandrum*), celery (*Apium*), Queen Anne's lace/carrot (*Daucus*), English Ivy (*Hedera*), ginseng (*Panax*), caraway (*Carum*), cumin (*Cuminum*), fennel (*Foeniculum*), umbrella tree (*Schefflera*), aralia (*Aralia*), penny wort (*Hydrocotyle*).

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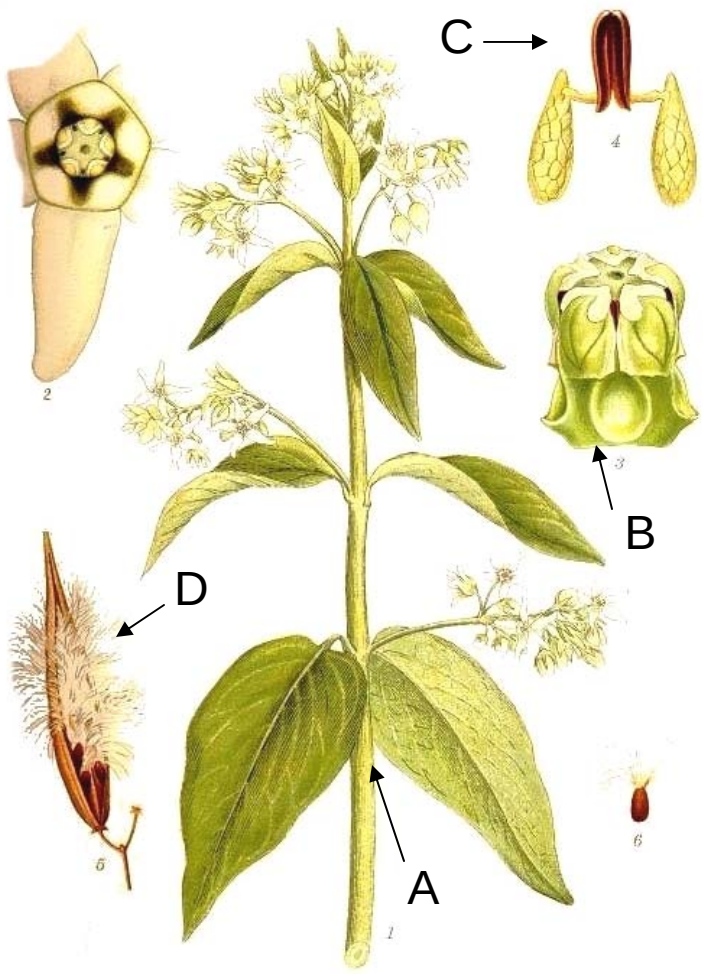
Apocynaceae MILKWEED & DOGBANE FAMILY



Vincetoxicum

- Leaves opposite, simple (**A**), pinnate venation
- Leaf margin smooth (**A**)
- Stipules absent (**A**)
- Latex (milky sap) in all branches and leaves
- Sepals 5, Petals 5, sometimes fused
- Ovary superior
- Anthers often fused, and sometimes fused with style head to a gynostegium (**B**), pollen in pollinia (**C**) in some species
- Fruit usually with 2 separate carpels, developing into 1-2 dry capsular parts or berries
- Seeds often with tufts of hairs at one end (**D**)

Note: Asclepiadaceae is now included in Apocynaceae.

Examples: dogbane (*Apocynum*), milkweed (*Asclepias*), rosy/Madagascar periwinkle (*Catharanthus*), vinca (*Vinca*), oleander (*Nerium*), frangipani (*Plumeria*), hoya (*Hoya*), bluestar (*Amsonia*), mandevilla (*Mandevilla*).

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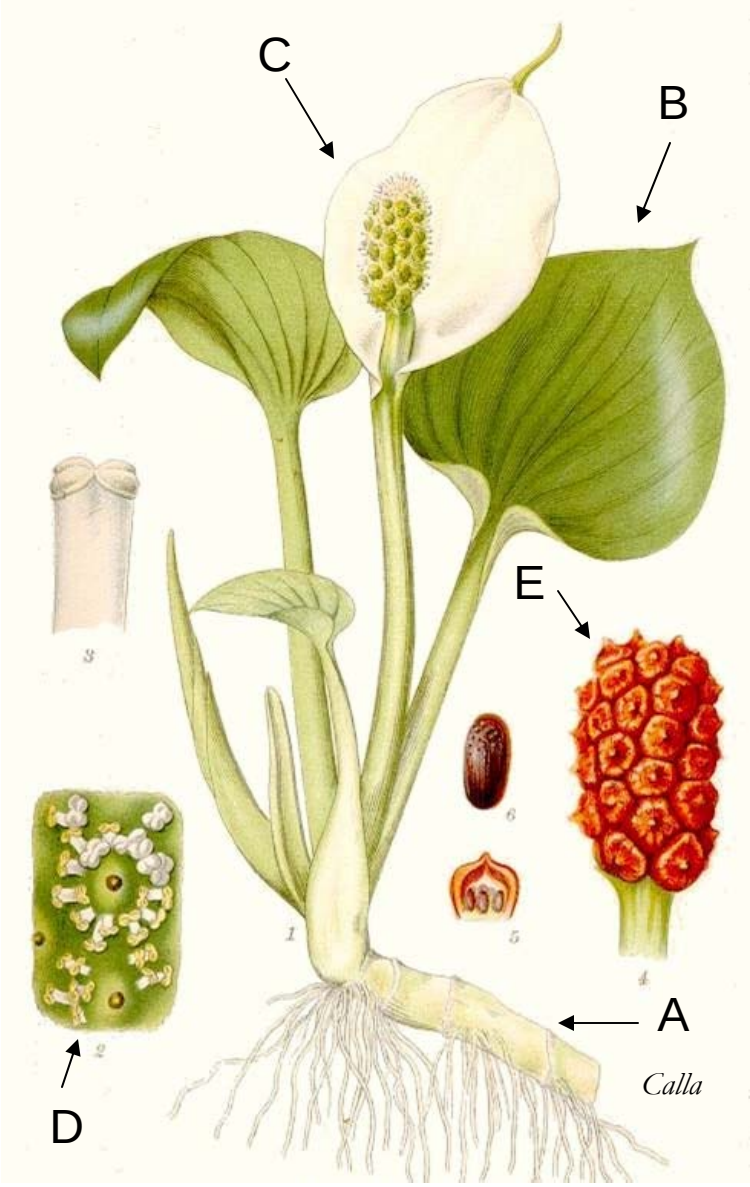
Araceae
ARUM FAMILY

- Shrubs, vines, or herbs, sometimes aquatic; often fleshy
- Rhizomes (**A**), corms, tubers common
- Leaves simple, with reticulate or parallel venation (**B**)
- Inflorescence a terminal spadix of tiny flowers, subtended by a colored leaf/bract (spathe) (**C**)
- Flowers sometimes unisexual, highly reduced, sessile (**D**)
- Fruits usually berries (**E**)



Note: Lemnaceae is now included in the Araceae.

Examples: taro (*Colocasia*), anthurium (*Anthirium*), arum (*Amorphophallus* and other genera), elephant's ear (*Caladium*), dumb cane (*Dieffenbachia*), duckweeds (*Lemna*, *Wolffia*), and many cultivated plants (*Monstera*, *Philodendron*, *Spathiphyllum*).

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Arecaceae PALM FAMILY

Areca

- Trees or shrubs, sometimes lianas or herbs
- Stem usually unbranched, without secondary growth
- Leaves large, pinnately or palmately divided (**A**), rarely simple
- Sheath at base of leaf
- Inflorescence axillary, large (**B**)
- Flowers sessile
- Tepals 6
- Fruit a fleshy drupe with one seed (**C**)

Examples: coconut (*Cocos*), date palm (*Phoenix*), oil palm (*Elaeis*), sago palm (*Metroxylon*), betel palm (*Areca*), rattan (*Calamus*), Açaí Palm (*Euterpe*), saw palmetto (*Serenoa*).

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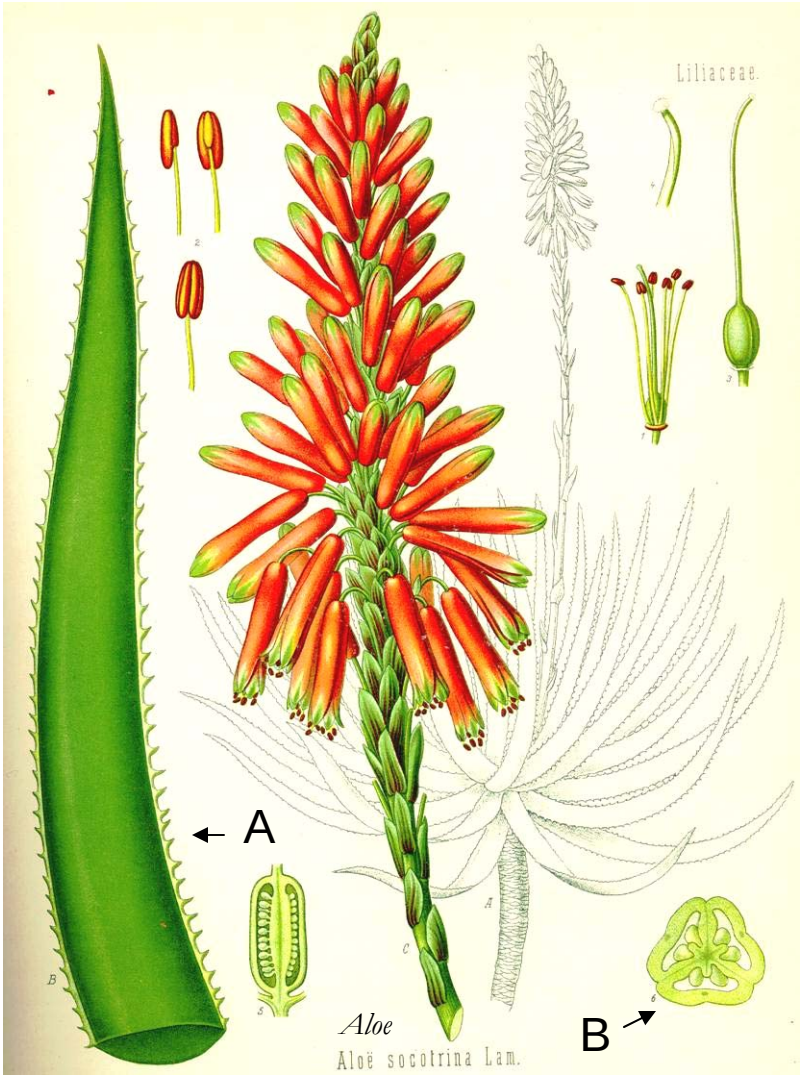
Asphodelaceae ALOE FAMILY



- Herbs, shrubs, rarely trees
- Succulents, especially leaves
- Leaves simple, alternate, parallel-veined, often with spiny or dentate margin (**A**)
- Inflorescence a raceme or panicle
- Flowers actinomorphic or zygomorphic
- Tepals 3+3, sometimes fused
- Stamens 6
- Ovary superior, 3 fused carpels, 3 locules, axile placentation (**B**)
- Fruit a capsule
- Seed with an aril

Note: Many of these genera were previously placed in Liliaceae.

Examples: aloe (*Aloe*), haworthia (*Haworthia*), asphodel (*Asphodelus*), red hot poker (*Kniphofia*).

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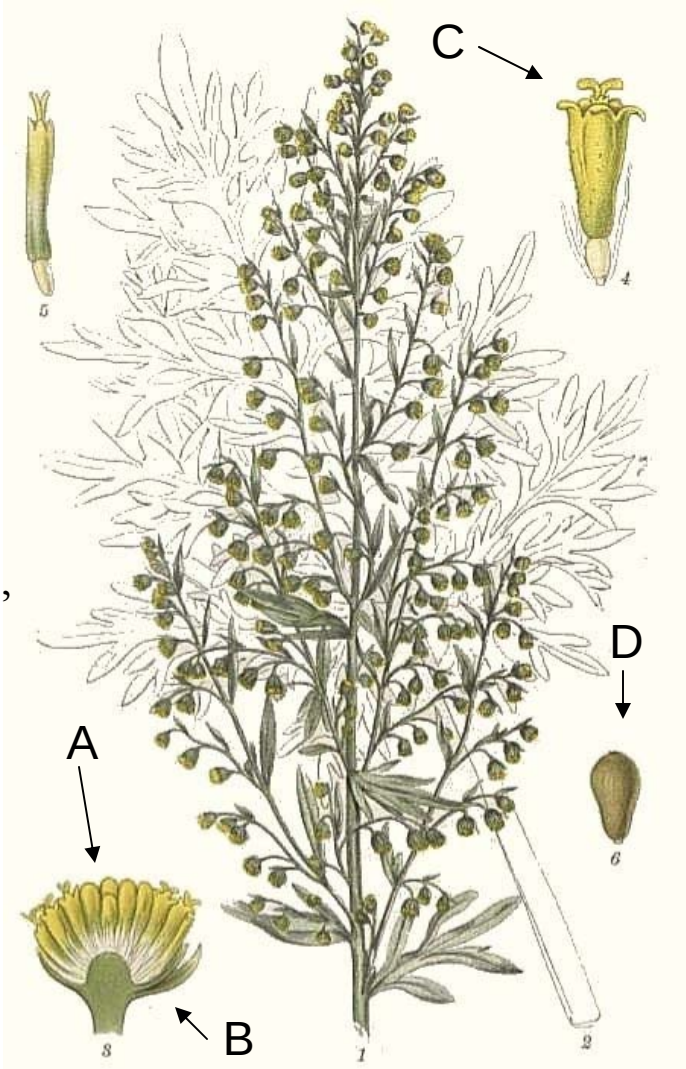
Asteraceae ASTER & SUNFLOWER FAMILY

- Herbaceous usually
- Leaves variable, with pinnate venation
- Inflorescence a head (capitulum, **A**) with many flowers, with involucral bracts surrounding it (**B**)
- Flowers small, either tubular (**C**) or tongue-shaped (ligulate)
- Sepals absent
- Petals fused, usually with 5 small lobes (**C**)
- Anthers fused into a ring around style
- Ovary inferior
- Fruit a dry nut (achene, **D**), often with hairs on top (pappus)



Artemisia

Examples: Echinacea (*Echinacea*), dandelion (*Taraxacum*), burdock (*Arctium*), mugwort, wormwood (*Artemisia*), chrysanthemum (*Dendranthema*), ox-eye daisy (*Leucanthemum*), asters (*Aster*, etc.), thistles (*Cirsium*, *Carduus*), sunflower (*Helianthus*), artichoke (*Cynara*), ragwort, groundsel (*Senecio*), knapweed (*Centaurea*), boneset, snakeroot (*Eupatorium*).

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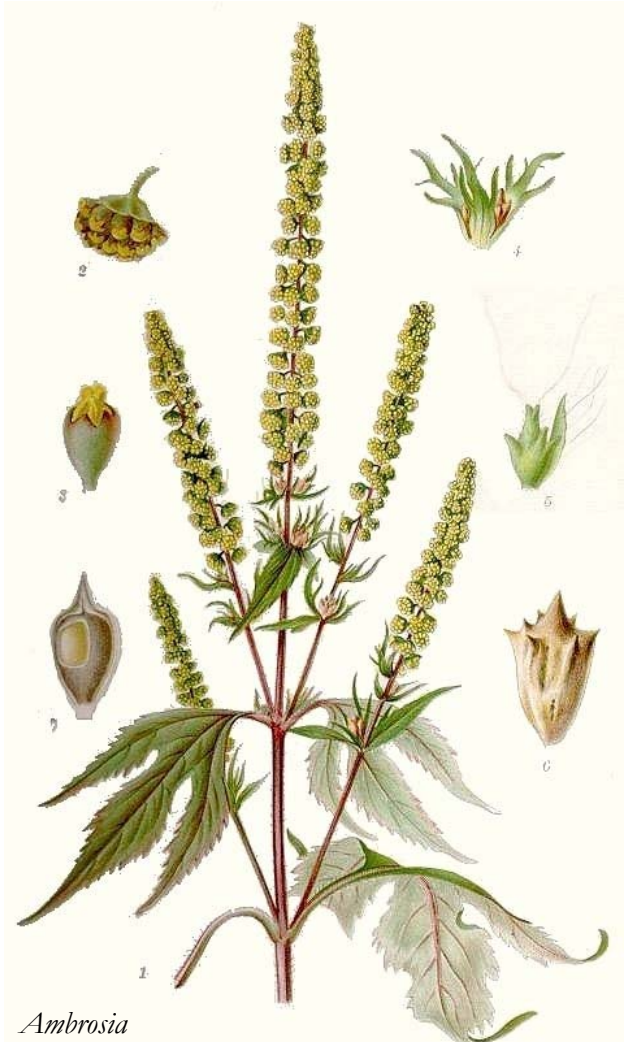
Asteraceae ASTER & SUNFLOWER FAMILY



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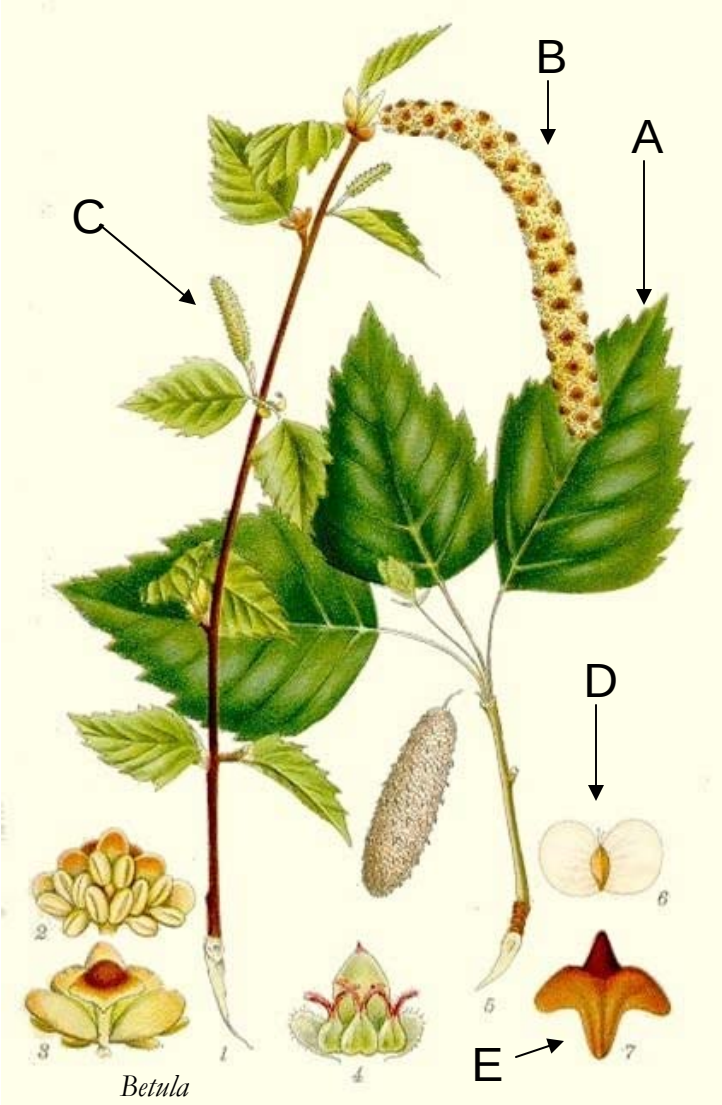
Asteraceae: Asterales: Euasterids II: Eudicots: Angiospermae

Betulaceae BIRCH FAMILY

- Trees or shrubs
- Leaves simple, spiral (**A**)
- Leaf margin with teeth (**A**)
- Inflorescences unisexual; male: hanging catkin (**B**), female: short upright catkin (**C**)
- Flowers wind-pollinated, unisexual
- Petals absent
- Styles 2 or 3
- Fruit a nut or 2-winged samara (**D**), surrounded by leafy bracts (**E**)



Betula

Examples: birch (*Betula*), alder (*Alnus*), ironwood (*Carpinus*), hazelnuts and filberts (*Corylus*).

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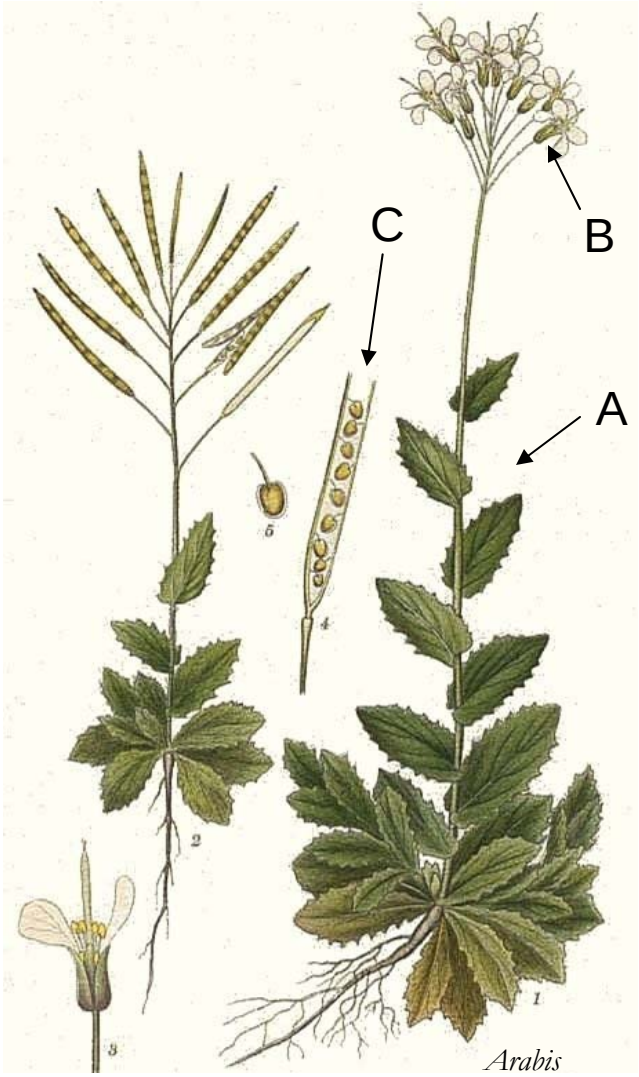
Brassicaceae s. str. MUSTARD FAMILY

- Herbaceous
- With mustard oils
- Leaves simple, alternate (**A**), often lobed, with pinnate venation
- Leaf edge often dentate (**A**) or lobed
- Inflorescence a raceme
- Petals 4, not fused, forming a cross + from above (**B**), white, yellow, or pink
- Stamens 6
- Fruit a dry capsule with inner wall (silique; **C**)



Note: This family circumscription refers to Brassicaceae s. str. and does not include Capparaceae (capers) and Cleomaceae.

Examples: white mustard (*Sinapis*), garlic mustard (*Alliaria*), horseradish (*Armoracia*), cabbage, broccoli, brussels sprouts, kale, collards, rutabaga, canola, black mustard, turnip (*Brassica*), arugula (*Diplotaxis,* 'rustica' type), mouse-ear and thale cress (*Arabidopsis*), yellow rocket (*Barbarea*), radish (*Raphanus*), woad (*Isatis*), water cress (*Nasturtium*).

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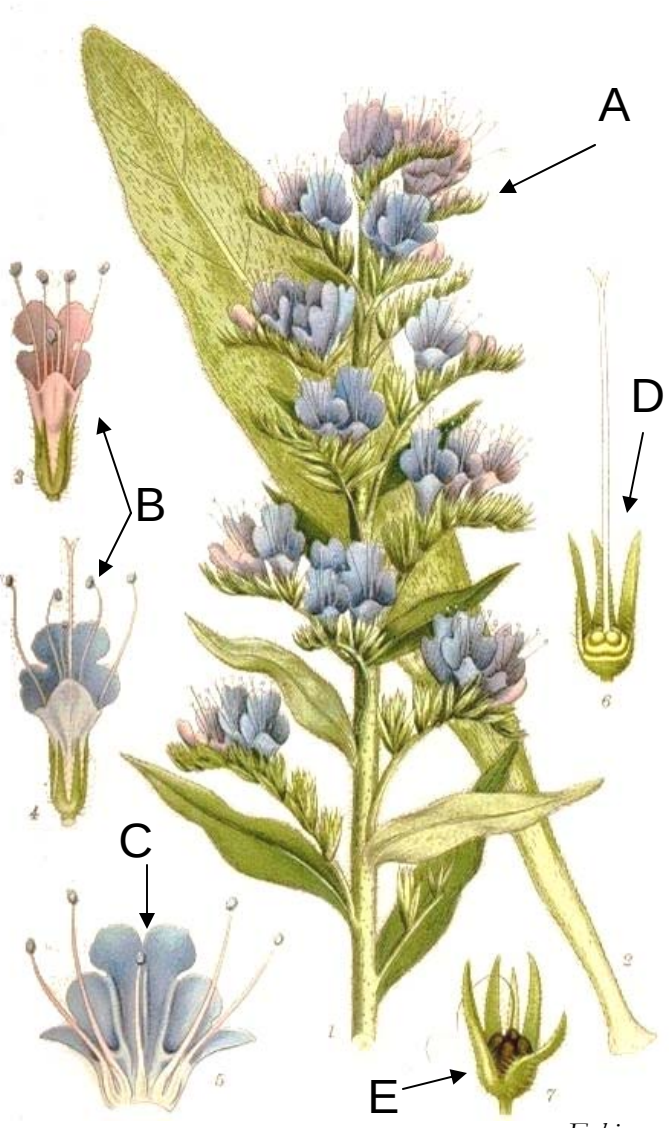
Boraginaceae s. str. BORAGE FAMILY

- Herbs with stiff hairs
- Leaves alternate, simple
- Inflorescence a scorpioid or helicoid cyme (**A**)
- Flowers sympetalous, actinomorphic, 5-merous
- Corolla often pink as young, then blue or purple (**B**)
- Anthers attached to corolla (**C**)
- Ovary superior, 2-carpellate, 4 locules
- Style 1, attached to base of ovary, in center (**D**)
- Fruit a schizocarp with 4 nutlets (**E**)



Echium

Note: These characters refers to Boraginaceae s.str.

Examples: borage (*Borago*), forget-me-not (*Myosotis*), comfrey (*Symphytum*), lungwort (*Pulmonaria*), viper's bugloss (*Echium*).

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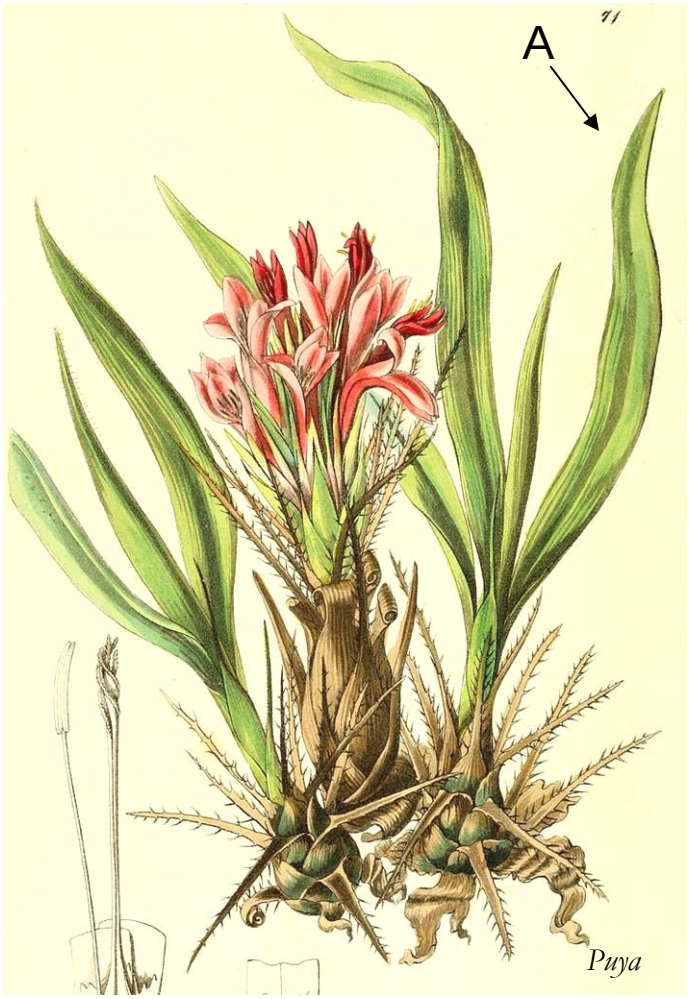
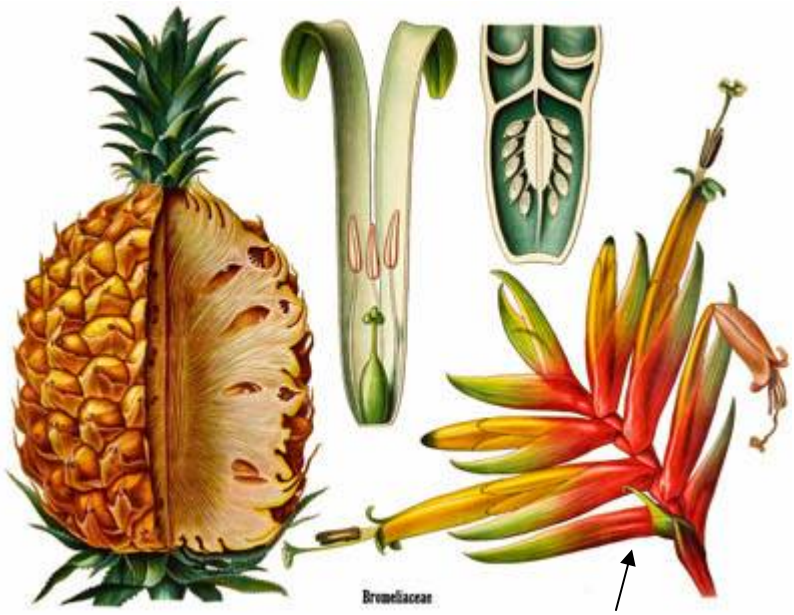
Bromeliaceae BROMELIAD FAMILY

- Herbs, terrestrial or epiphytic
- Leaves simple, sheathing at base, alternate (**A**); with peltate scales
- Leaf margins entire, serrate, or with spines
- Inflorescence a terminal spike, raceme or head
- Bracts often brightly colored (**B**)
- Tepals 6
- Fruit a berry or capsule (multiple fruit in pineapple)



Examples: pineapple (*Ananas*), air plant and Spanish moss (*Tillandsia*).



Ananas

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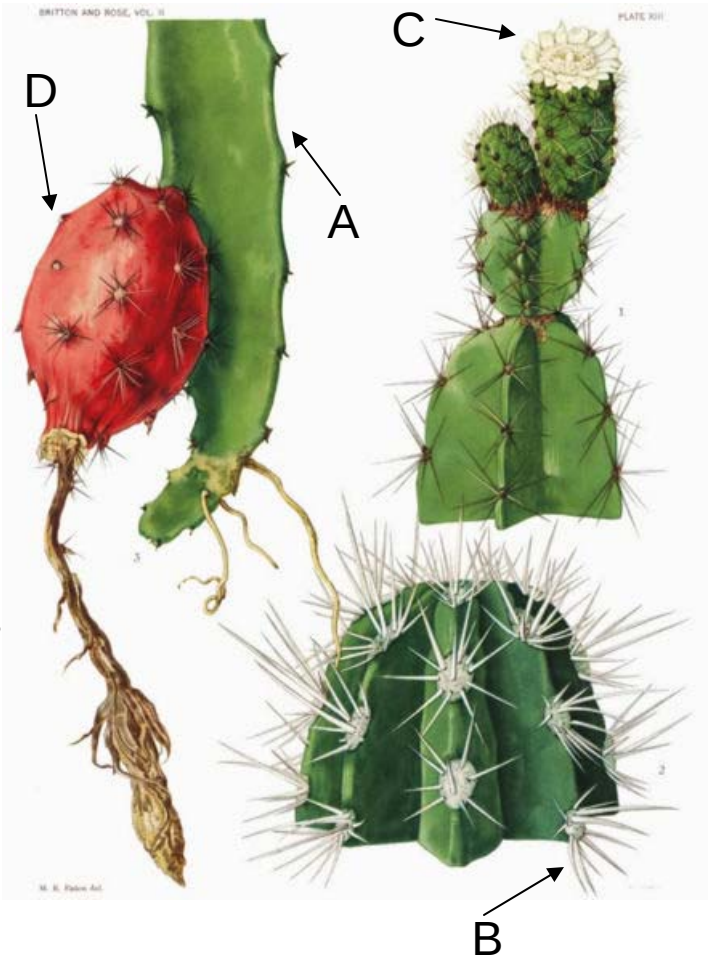
Cactaceae CACTUS FAMILY



- Shrubs or trees, perennial
- Stems succulent, sometimes triangular or flattened (**A**)
- Leaves highly reduced or absent
- Spines from axillary 'buds', many together, not paired two together (instead of leaves in most species, or leaves quickly deciduous; **B**)
- Flower usually solitary (**C**)
- Tepals many; anthers many
- Ovary inferior
- Fruit a berry (**D**)

Examples: prickly pear, nopales (*Opuntia*), christmas and easter cactus (*Schlumbergera*), peyote (*Lophophora*), pitaya, dragon fruit (*Hylocereus*).

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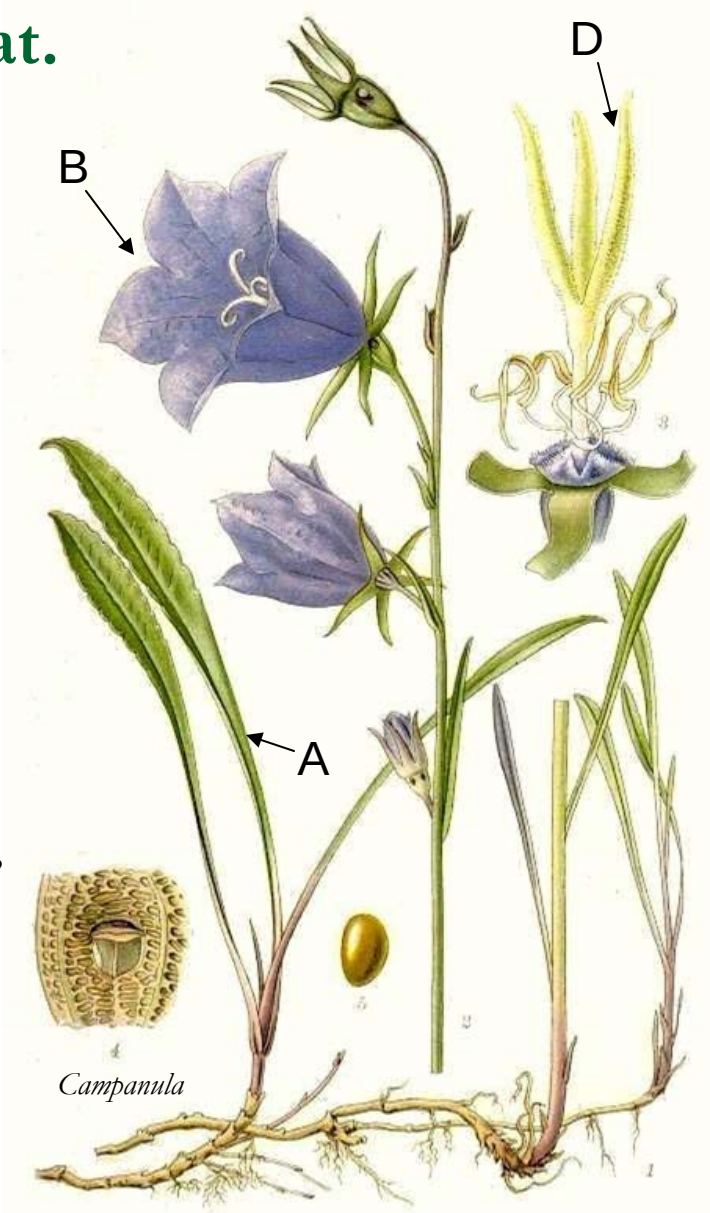
Campanulaceae s. lat. BLUEBELL FAMILY

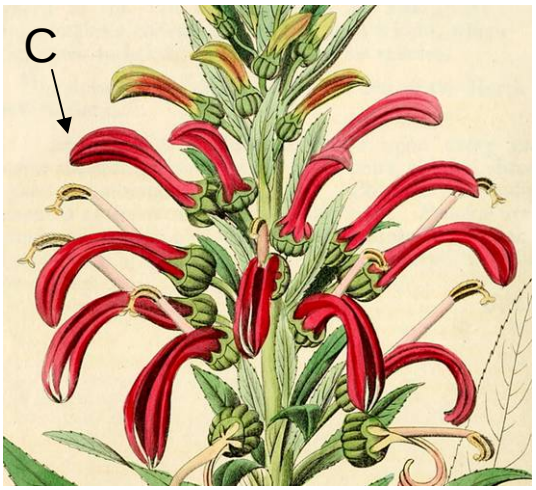
- Herbs, rarely shrubs or trees
- With latex.
- Leaves usually alternate, simple (rarely compound), without stipules (**A**).
- Petals fused; 5
- Corollas either bellshaped (**B**) or two-lipped or tubular (**C**)
- Ovary inferior, with 2-5 carpels, axile placentation
- With secondary pollen presentation, with pollen deposited on the outside of the style, or similarly (**D**)
- Fruit a berry or capsule

Note: Lobeliaceae is included in Campanulaceae.



Campanula

Examples: bell flower (*Campanula*), lobelia, cardinal flower (*Lobelia*), balloon flower (*Platycodon*).



Lobelia

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Caryophyllaceae CARNATION & PINK FAMILY

- Herbaceous
- Leaves opposite (**A**), simple, with pinnate venation
- Leaf edge smooth
- Stems often with thickened nodes (**A**) at base of each leaf pair
- Sepals 5, fused (**B**)
- Petals 5, not fused
- Fruit a dry capsule opening at top (**C**)
- Seeds attached to central column inside capsule
- Seeds many, black, often strongly curved (**D**)

Examples: Carnation (*Dianthus*), corncockle (*Agrostemma*), chickweed (*Cerastium*, *Stellaria*), soapwort (*Saponaria*), campion (*Silene*), baby's breath (*Gypsophila*).

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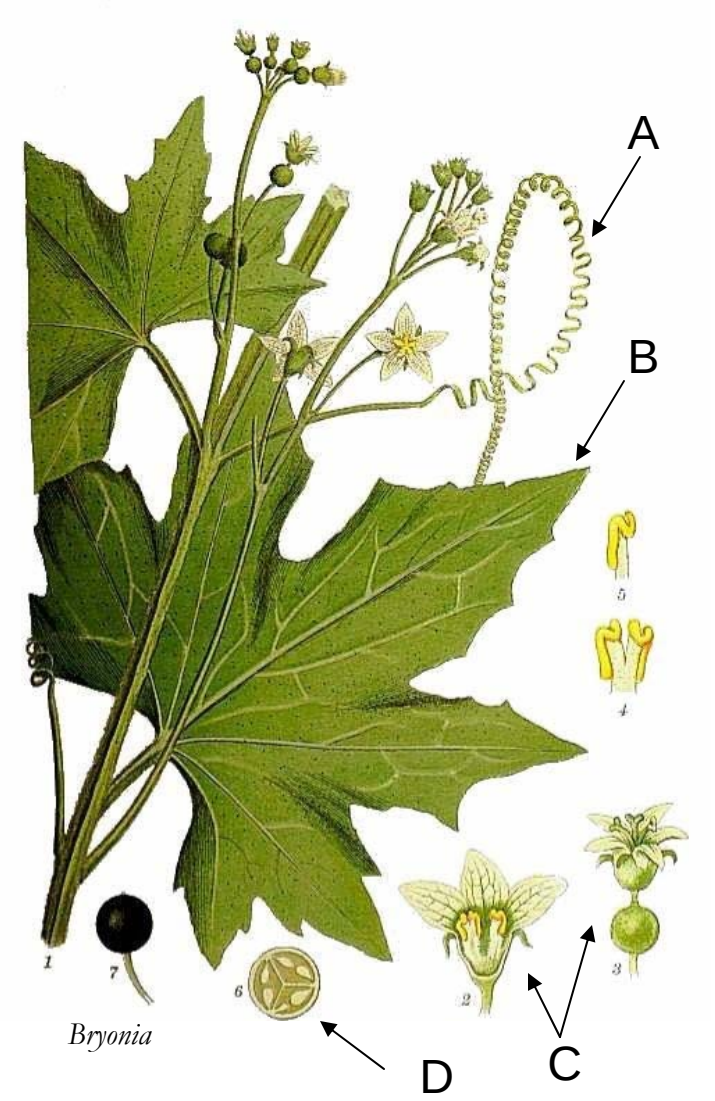
Cucurbitaceae CUCUMBER FAMILY

- Vines
- One tendril per node (**A**)
- Leaves simple, alternate, palmately veined, often lobed, no stipules (**B**)
- Inflorescence axillary, solitary flowers common
- Flowers unisexual (rarely not), with hypanthium (**C**)
- Petals fused or absent, 5
- Anthers 5
- Ovary inferior, 3 carpels, parietal placentation (**D**)
- Fruit a berry or pepo (or capsule or samara)



Bryonia

Examples: melon and cucumber (*Cucumis*), watermelon (*Citrullus*), squashes and pumpkins (*Cucurbita*), loofah (*Luffa*).

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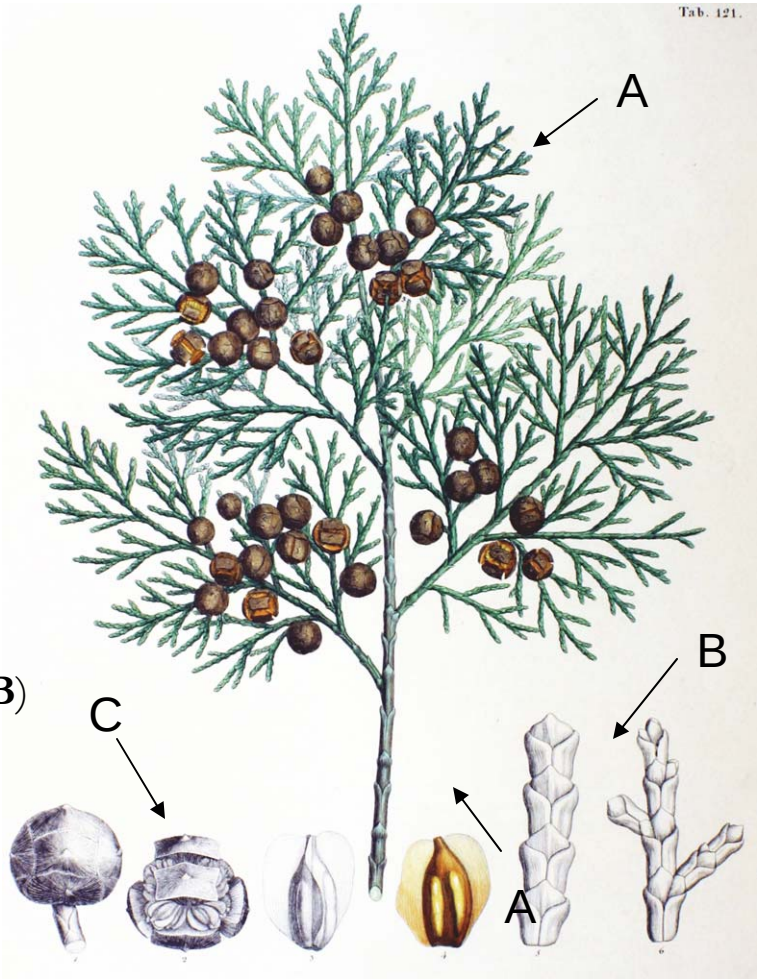
Cupressaceae CEDAR FAMILY



- Trees or shrubs
- Bark peels off in strips
- Branches often flattened in appearance (**A**)
- Leaves evergreen, scale-like (**B**)
- Unisexual cones with few cone scales (**C**)
- Female cones sometimes berry-like, leathery (**C**).

Note: Taxodiaceae is now included in Cupressaceae.

Examples: cedar, cypress (*Cupressus, Chamaecyparis*), arbor-vitae (*Thuja*), juniper (*Juniperus*), dawn redwood (*Metasequoia*), bald cypress (*Taxodium*), giant seqouia (*Sequoiadendron*), coast redwood (*Sequoia*).

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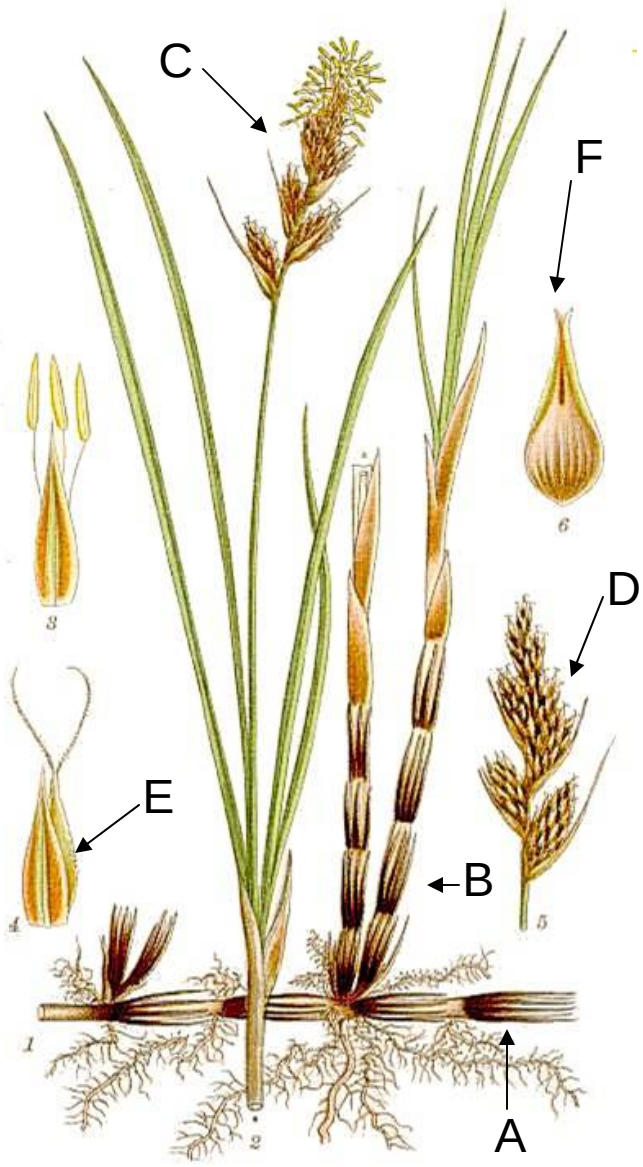
Cyperaceae SEDGE FAMILY



- Herbaceous monocot
- Stems often as rhizomes (**A**) and upright culms (**B**)
- Stems 3-sided, without nodes, solid, not hollow
- Leaves linear, grass-like, with parallel veins, arranged at 3 angles (tristichous)
- Leaves sheathing at base
- Inflorescence often divided into male and female parts (**C**), as spikelets (**D**) on terminal branches
- Flowers small, unisexual, sitting behind a bract (**E**)
- Sepals and petals absent (rarely present)
- Anthers 3, hanging free
- Ovary superior, often inside a bottle-shaped structure (perigynium, **F**)
- Fruit a small, 1-seeded nut

Examples: sedge (*Carex*), nut sedge and papyrus (*Cyperus*)

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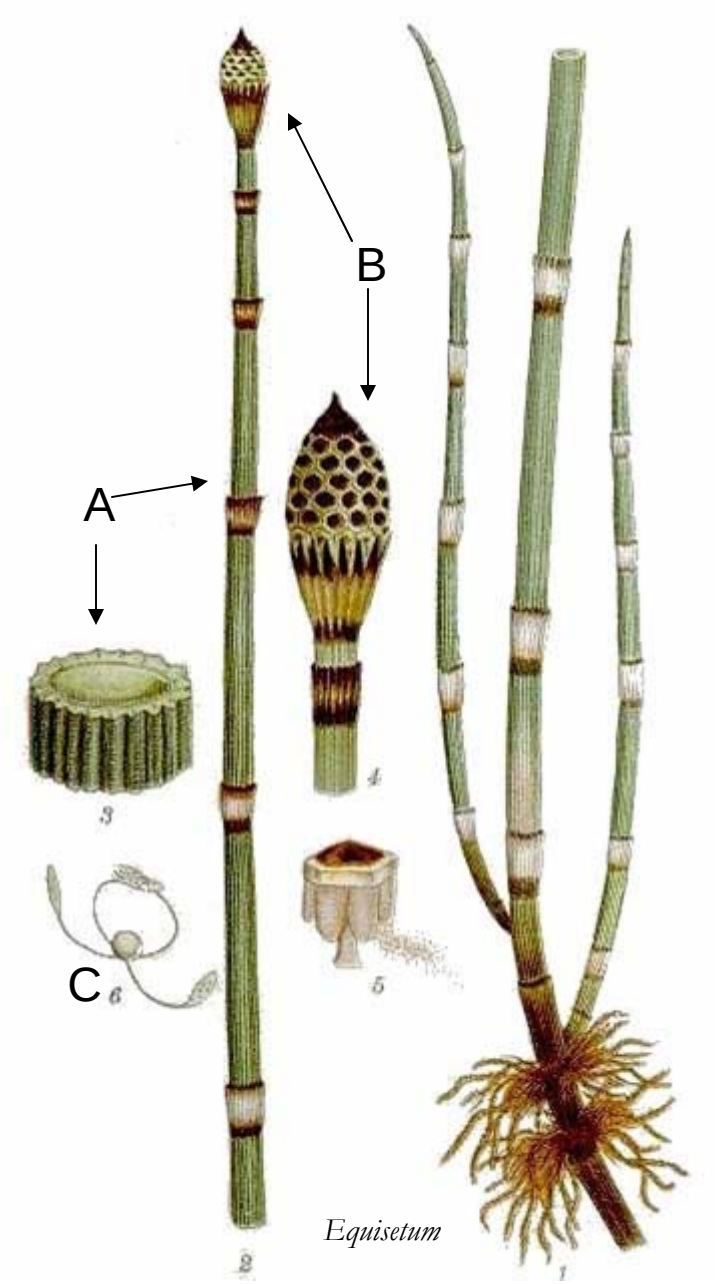
Equisetaceae HORSETAIL FAMILY

- Herbs
- Stems ridged, hollow, circular with nodes and sheaths (**A**)
- Leaves sometimes absent, thin and hollow
- Sporangia in terminal heads (**B**)
- Spores small, with arms (**C**)

Examples: horsetail (*Equisetum*).



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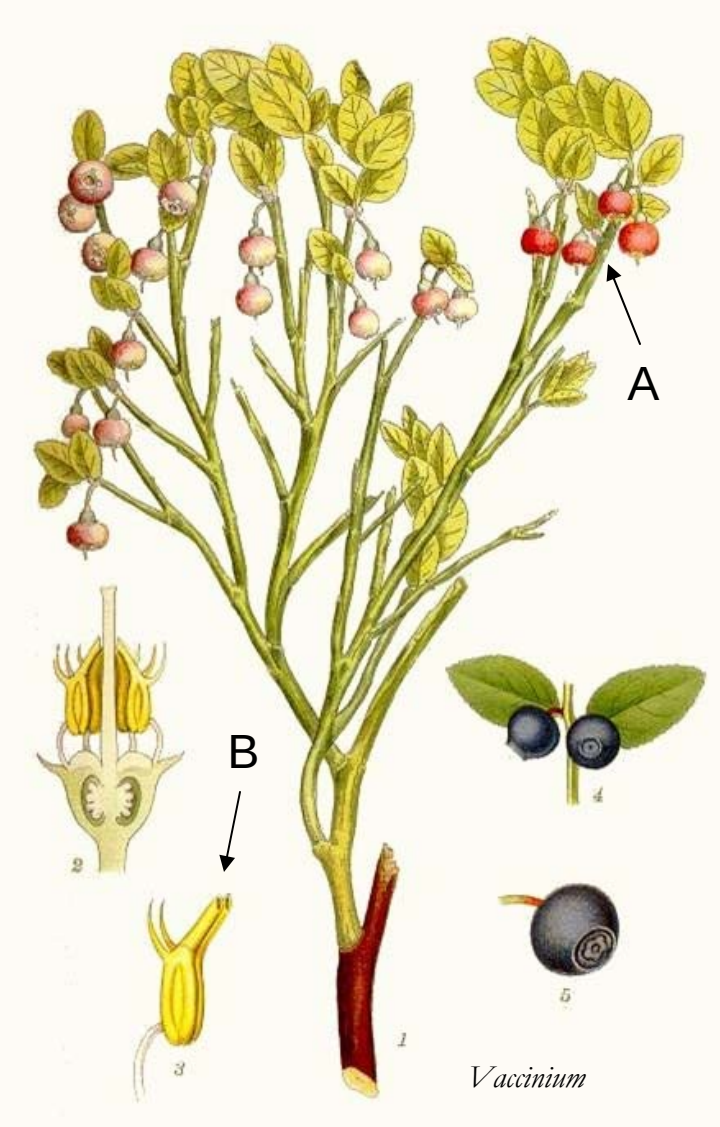
Ericaceae s. lat. BLUEBERRY FAMILY



- Shrubs or small trees, sometimes herbs (some species mycotrophic and without chlorophyll).
- Leaves simple, without stipules; often leathery and evergreen.
- Flowers actinomorphic (arely bilateral), often hanging (**A**).
- Petals 5 (rarely 0-7), fused.
- Stamens in two whorls, 5+5 (rarely less), attached to petals
- Anthers inverted (bent upside down during development), often with pores as openings (**B**).
- With nectary disk inside stamens.
- Ovary superior or inferior, usually with 5 carpels
- Style single
- Fruit a capsule, berry, or drupe.

Note: Included in the Ericaceae is Empetraceae, Monotropaceae, and Pyrolaceae.

Examples: blueberry, cranberry, etc. (*Vaccinium*), azalea and labrador tea (*Rhododendron*, *Ledum*), heather (*Calluna*), wintergreen (*Chimaphila*, *Pyrola*), sheep laurel and mountain laurel (*Kalmia*), indian pipe (*Monotropa*).

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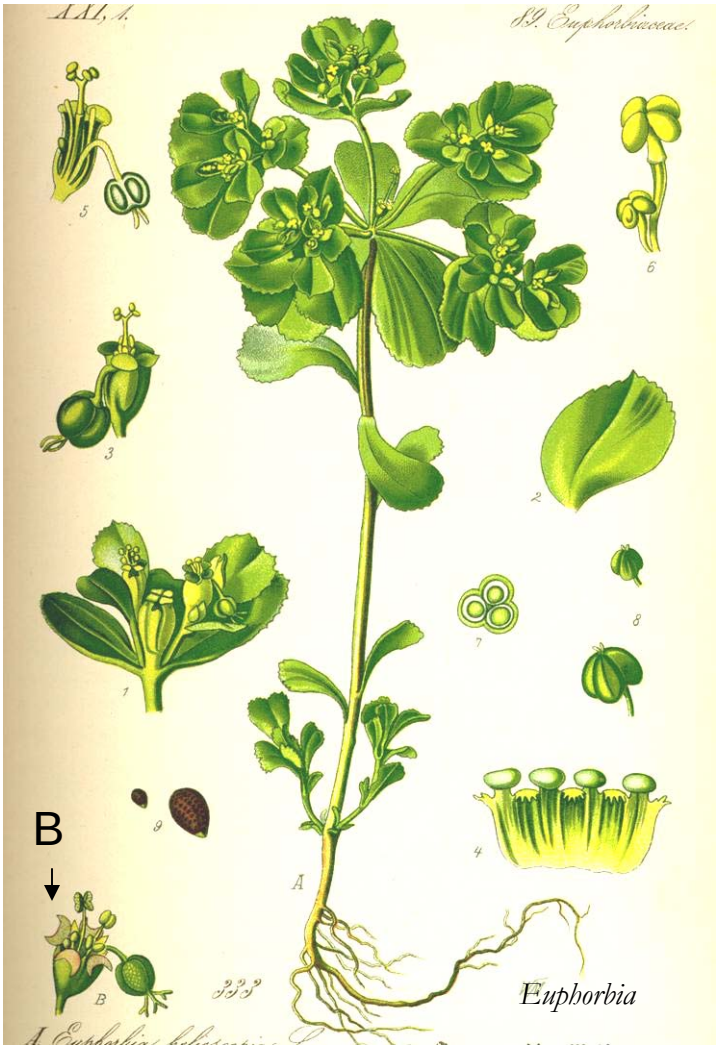
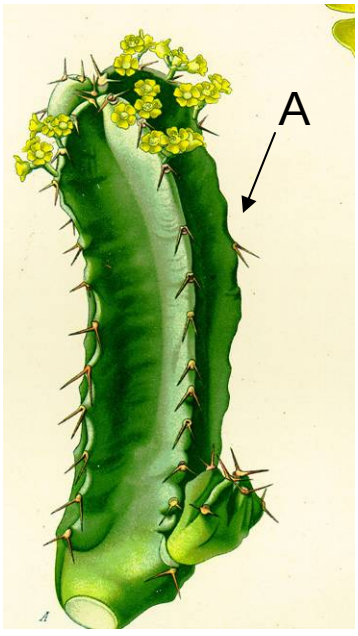
Euphorbiaceae SPURGE FAMILY

- Herbs, shrubs, trees or vines
- With latex, often white
- Stems often succulent and fleshy (**A**)
- Leaves simple, two stipules often present (sometimes as two spines below each leaf, **A**)
- Inflorescence cyme or cyathium (**B**)
- Flowers unisexual, 5-merous; sometimes highly reduced without sepals and petals
- Nectaries common
- Ovary superior, 3 carpels
- Fruit a schizocarp, capsule, or drupe





Examples: poinsettia and euphorbs (*Euphorbia*), castor bean (*Ricinus*), cassava and manihot (*Manihot*), rubber tree (*Hevea*), copper leaf (*Acalypha*), croton (*Croton*, *Codiaeum*), physic nut (*Jatropha*) .

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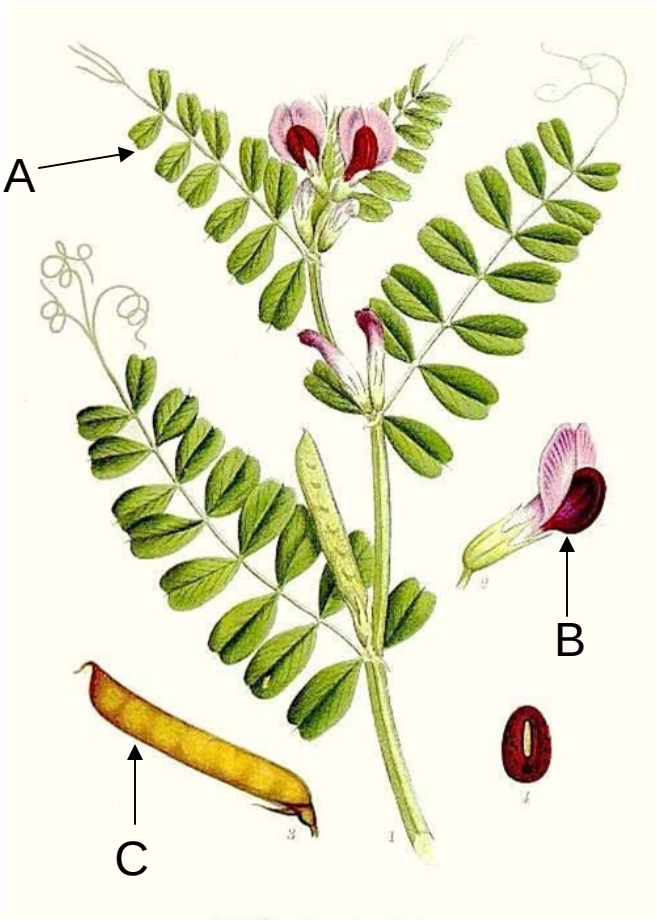
Fabaceae
BEAN FAMILY



- Mostly herbaceous, some trees and shrubs
- Leaves alternate, compound (**A**, with many small leaflets), sometimes with tendrils
- Stipules at base of each leaf (variable in size)
- Corolla of 'butterfly-type' (**B**), bilateral with 5 parts: banner/standard, wings, keel
- Keel hidden between wings
- Stamens and style hidden inside keel
- Stamens 10 , 9 often fused
- Fruit a bean (legume, **C**), a dry capsule without inner dividing walls, and with seeds attached to one side
- Seeds splits in 2, nutrients stored in dicotyledons inside seed

Note: the flower characters work only for subfamily Faboideae.

Examples: beans (*Phaseolus*), peas (*Vicia, Pisum*), licorice (*Glychyrriza*), soybean (*Glycine*), chickpeas, peanuts (*Arachis*), lentil (*Lens*), sweet pea (*Lathyrus*), carob (*Ceratonia*), alfalfa (*Medicago*), clover (*Trifolium*).

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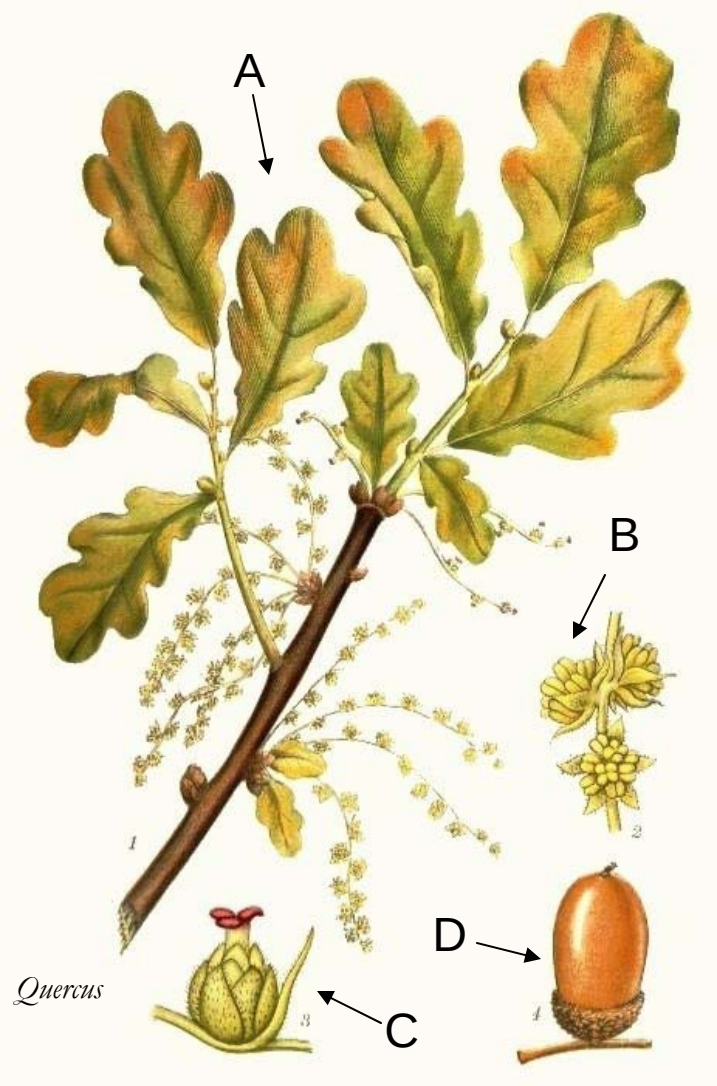
Fagaceae
OAK FAMILY

- Trees
- Leaves simple, usually alternate, often lobed (**A**)
- Inflorescences unisexual with male catkins or heads (**B**), and a few female flowers inside wooden bracts (cupule) at the base of the male inflorescence (**C**)
- Woody bracts
- Flowers unisexual, tiny, often highly reduced, wind-pollinated
- Fruit a nut (acorn in oaks), surrounded by the cupule (**D**)



Examples: oak (*Quercus*), chestnut (*Castanea*), beech (*Fagus*).

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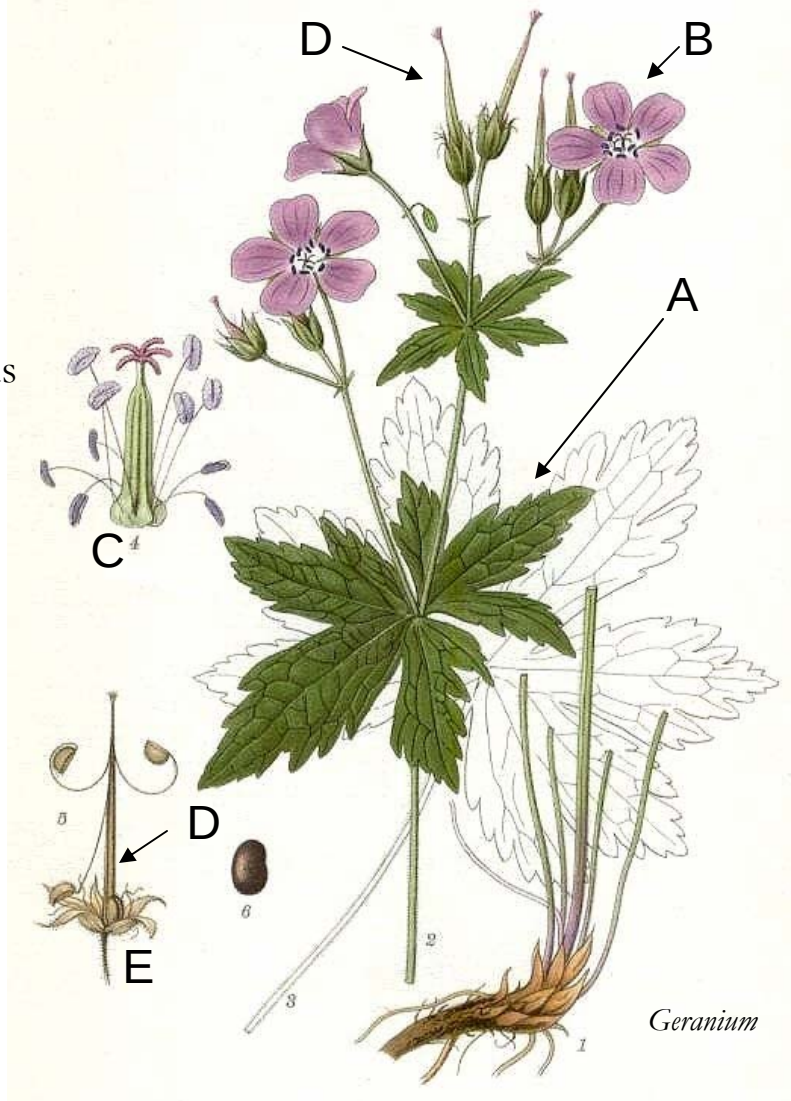
Geraniaceae GERANIUM FAMILY



- Herbs
- Often with aromatic oil glands and hairs, fragrant
- Leaves simple or compound, usually palmately veined and lobed, alternate (**A**)
- Stipules common
- Inflorescence a cyme, umbel or flowers single
- Flowers actinomorphic or zygomorphic
- Petals 5, free (**B**)
- Stamens 10, in two whorls, fused at base into a ring, staminodes common (**C**)
- Ovary superior, usually 5 fused carpels, styles 5 (**C**)
- Style growing longer and firmer in fruit (**D**)
- Fruit a capsule or schizocarp (**E**)

Examples: crane's bill, stork's bill, filaree (*Geranium*, *Pelargonium*, *Erodium*).

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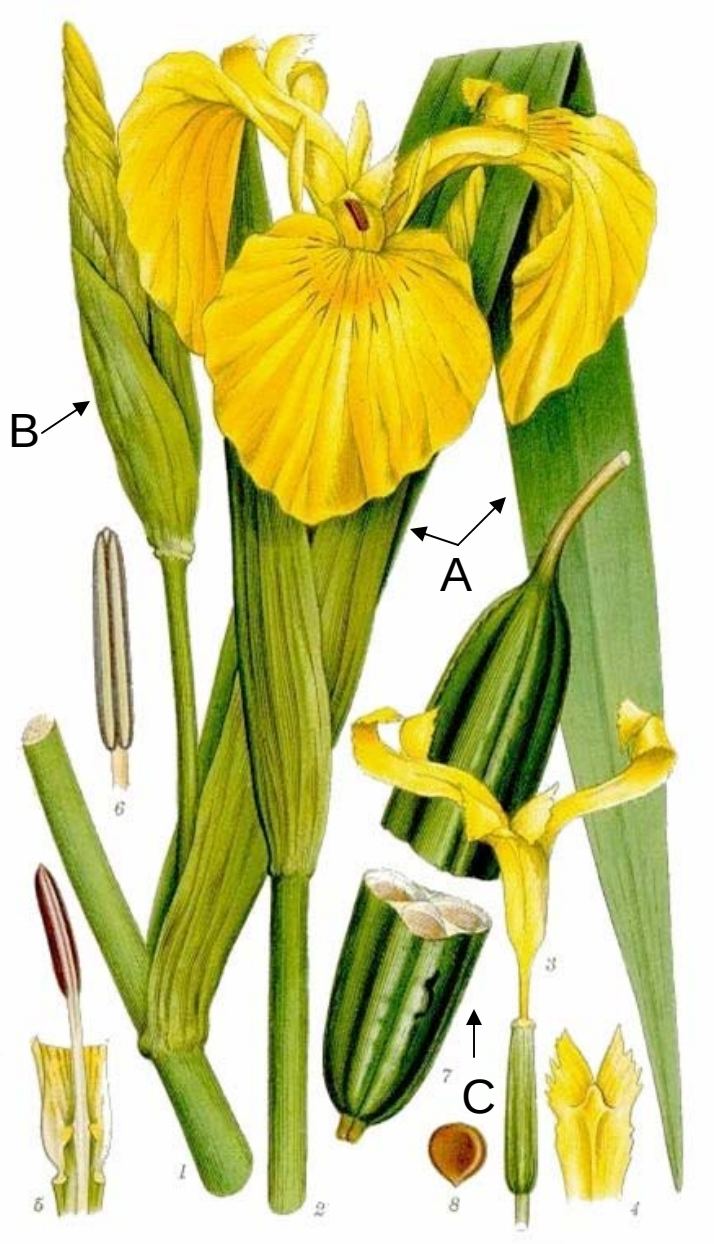
Iridaceae
IRIS FAMILY

- Herbs or shrubs
- Rhizomes, corms, and bulbs common
- Leaves sometimes unifacial, or simple and linear-narrow, often sheathing at base, parallel-veined (A)
- Inflorescence terminal, spike, cluster or solitary flowers, often with bracts below (B)
- Tepals 3+3, sometimes of different sizes
- Stamens 3
- Ovary inferior, 3 fused carpels, 3 locules, placentation axile (C)
- Style often petal-like
- Fruit a capsule



Iris

Examples: iris (*Iris*), gladiolus (*Gladiolus*), freesia (*Freesia*), crocus, saffron (*Crocus*), blue-eyed grasses (*Sisyrhinchium*).

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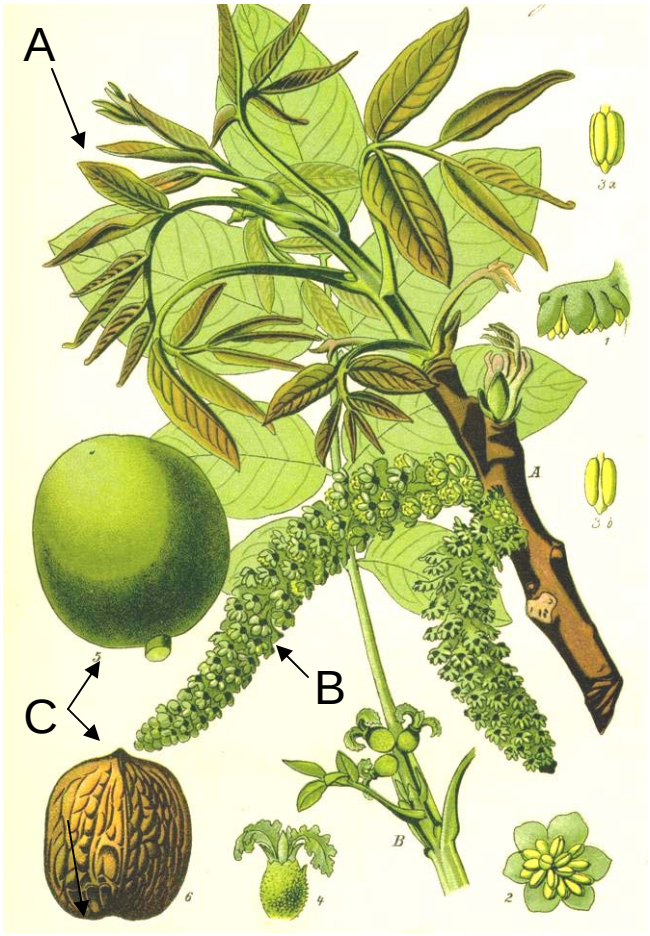
Juglandaceae WALNUT FAMILY

- Trees, deciduous
- Leaves alternate, pinnately compound (**A**), no stipules, aromatic when crushed
- Inflorescences unisexual
- Male catkins long, hanging (**B**)
- Female flowers solitary or small groups
- Flowers reduced, no sepals or tepals, wind-pollinated
- Fruits drupe-like, but is a nut enclosed in fleshy or hard involucres (husks), sometimes these fall off (**C**)



Juglans

Examples: hickory and walnut (*Juglans*), pecan (*Carya*), wingnut (*Pterocarya*).

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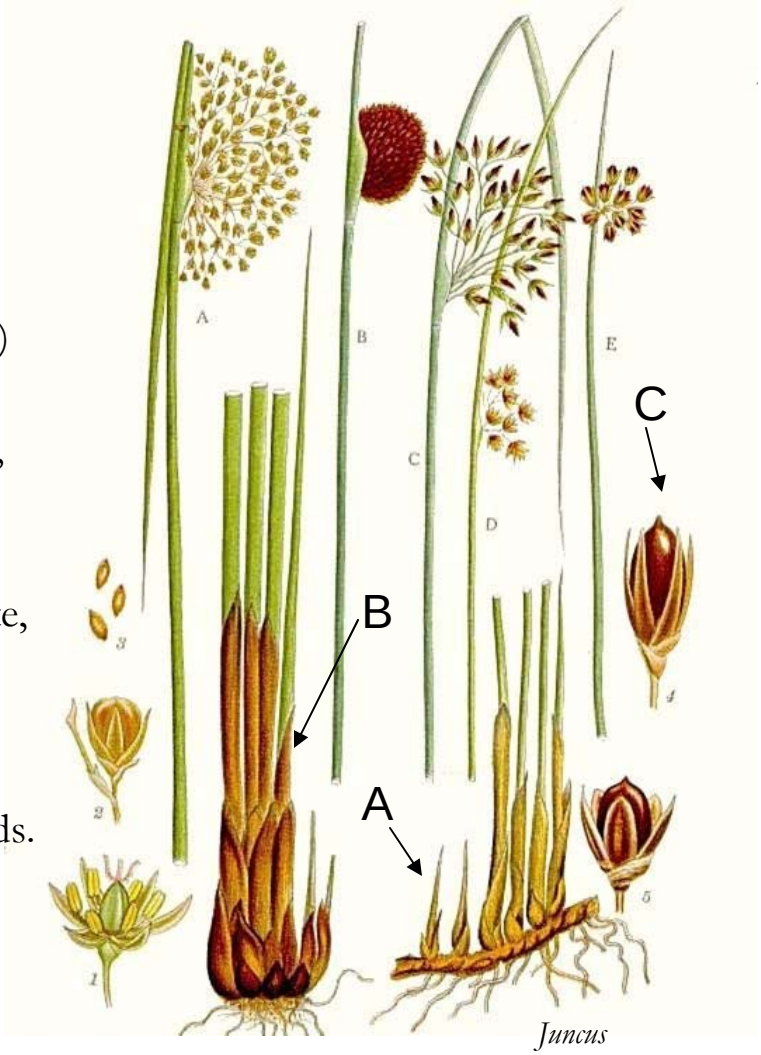
Juncaceae RUSH FAMILY

- Herbs, often with rhizomes (**A**) and perennial
- Stem sometimes round, hollow, or triangular, similar to leaves
- Leaves simple, grass-like and slender, parallel-veined, alternate, sheathing around stem (**B**), often tristichous (arranged in 3 rows)
- Inflorescences as cymes or heads.
- Flowers small, rather reduced, actinomorphic
- Tepals 6, not fused, brownish with thin margins (**C**).
- Stamens 6
- Ovary superior, 3 fused carpels
- Style 3-branched
- Fruit a capsule, usually brown



Juncus

Examples: rush (*Juncus*), wood rush (*Luzula*).

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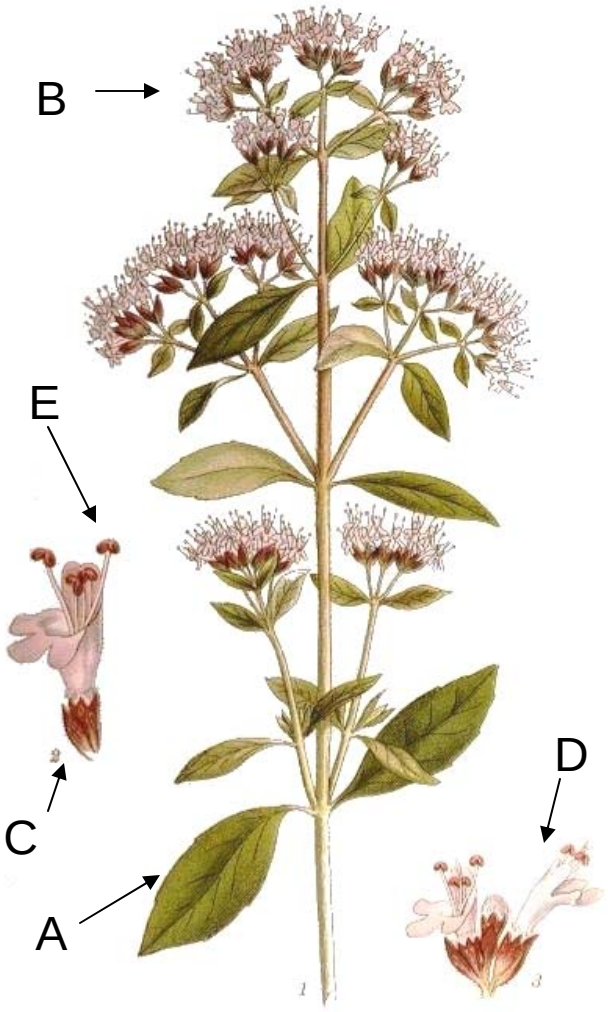
Lamiaceae MINT FAMILY

- Herbaceous (some woody in the tropics)
- Aromatic, with essential oils, often hairy with glands in or on leaves or glandular hairs
- Leaves opposite**,** simple (**A**), arranged at 90 degrees angle to each other
- Stipules absent (**A**)
- Stem usually quadrangular
- Flowers in groups (verticillasters) in leaf axils or in terminal spikes (**B**)
- Sepals fused, 5 (**C**)
- Corolla 2-lipped (**D**)
- Stamens 2 or 4 (**E**)
- Fruits: 4 nutlets hidden inside calyx



Origanum

Examples: basil (*Ocimum*), mint (*Mentha*), sage (*Salvia*), thyme (*Thymus*), rosemary (*Rosmarinus*), lavender (*Lavandula*), catnip (*Nepeta*), beebalm (*Monarda*), dead nettle (*Lamium*), coleus (*Coleus*), teak (*Tectona*).

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Lauraceae LAUREL FAMILY

- Trees and shrubs
- With aromatic oil glands, leaves often punctate
- Leaves simple, evergreen, alternate, rarely lobed
- Stipules absent
- Inflorescence axillary, cyme or solitary flowers (**A**)
- Flowers small, actinomorphic, with hypanthium
- Tepals 3+3, free
- Stamens 3-12, some as staminodes
- Anther opens with 2 or 4 valves popping open (**B**)
- Ovary 1-carpellate, usually superior
- Fruit berry or drupe

Laurus

Examples: bayleaf (*Laurus*), avocado (*Persea*), sassafras (*Sassafras*), cinnamon, camphor (*Cinnamomum*).

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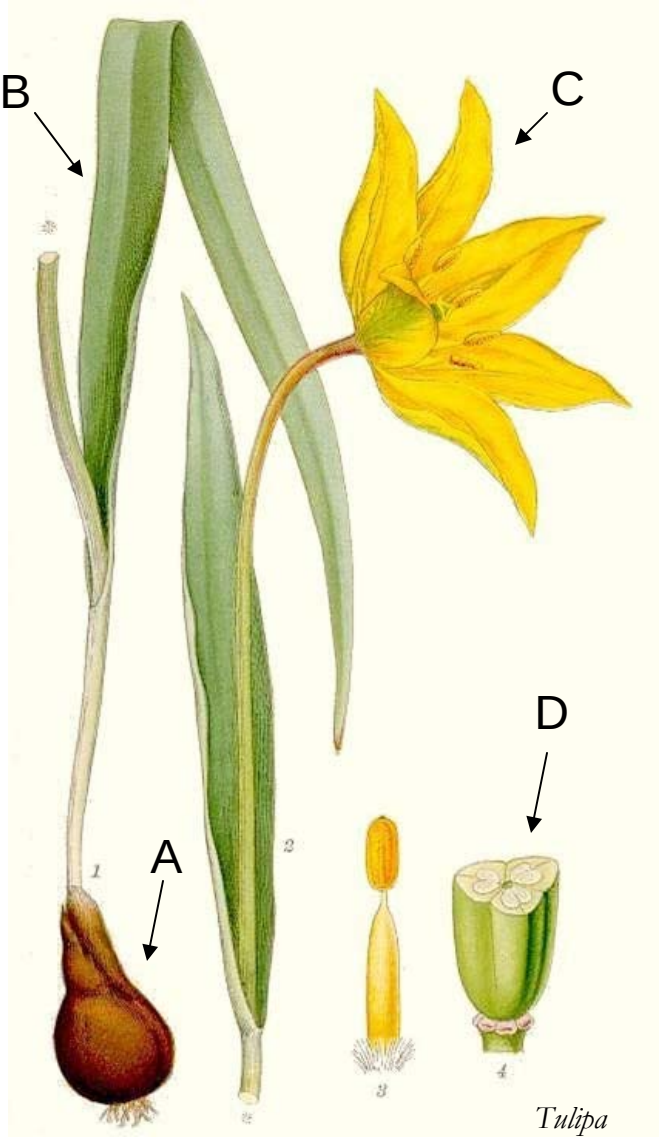
Liliaceae s. str.
LILY FAMILY



- Perennial herbs
- Bulbs or rhizomes (**A**)
- Does not smell like onion
- Leaves alternate (rarely whorled), often basal, sheathing at base, parallel-veined (**B**)
- Inflorescence terminal, raceme or solitary flower
- Tepals 6, free (**C**), often spotted or striped, with nectaries at base
- Stamens 6, free.
- Ovary superior, 3-carpellate, 3 locules (**D**), axile placentation
- Style single, stigma 3
- Fruit a capsule
- Seeds flattened, ellipsoid to rounded

Note: Liliaceae were previously a larger family, but many genera have been moved to other families such as Alstroemeriaceae, Colchicaceae, Melianthaceae, and Smilacaceae.

Examples: tulips (*Tulipa*), lily (*Lilium*), fritillary (*Fritillaria*), trout lily (*Erythronium*).

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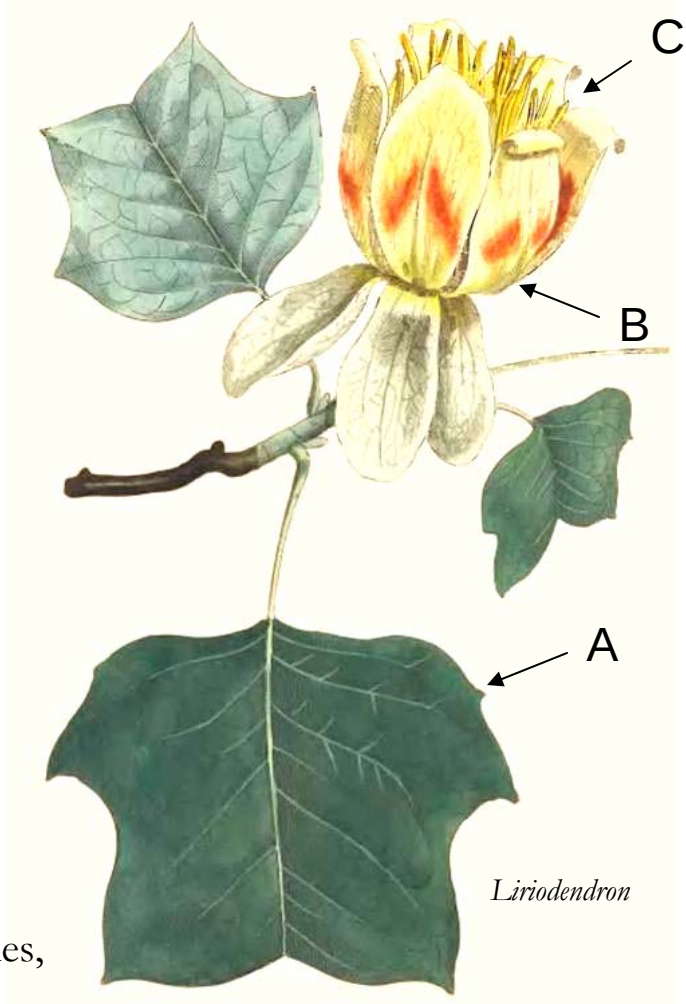
Magnoliaceae MAGNOLIA FAMILY

- Tree and shrubs
- Leaves simple, alternate (**A**), with deciduous stipules around the buds in spring
- Flower terminal, solitary, large (**B**)
- Tepals many (rarely few), whorled or spirally arranged
- Anthers many (**C**)
- Ovaries many, apocarpous, on elongated structure in center of flower
- Fruit an aggregate of berries, follicles, or samaras



Examples: magnolia (*Magnolia*), tulip tree (*Liriodendron*).

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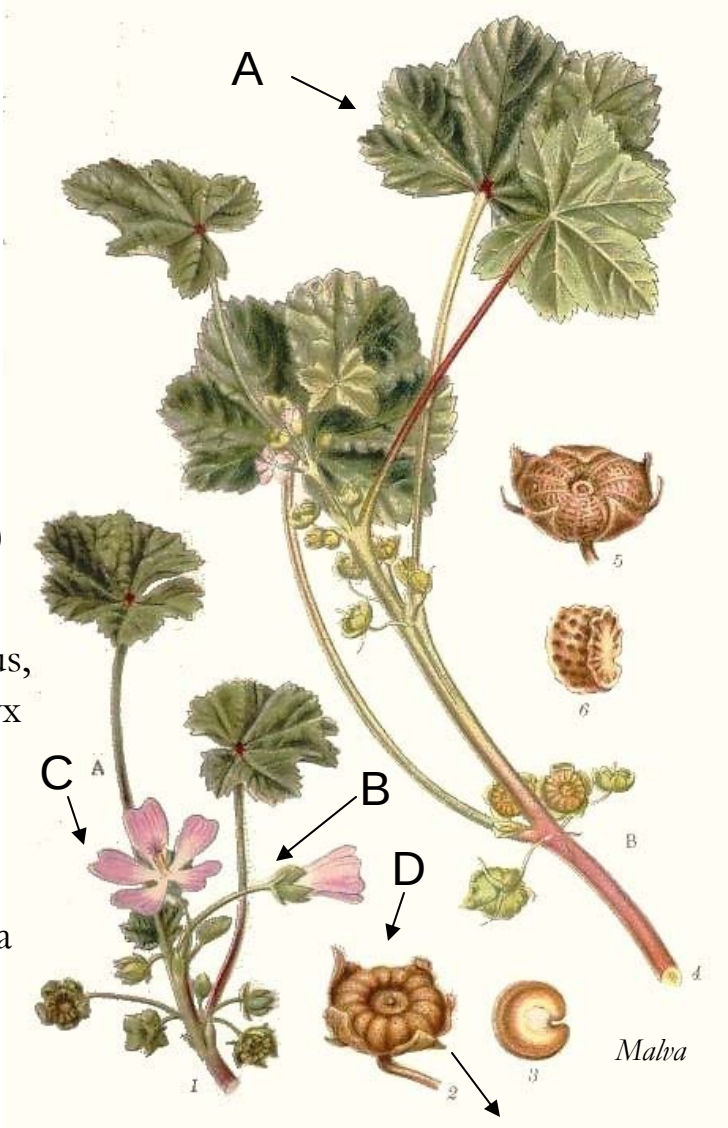
Malvaceae s. lat. COTTON FAMILY



- Herbs (shrubs or trees)
- With stellate or peltate hairs (star-shaped or stalked scales)
- Leaves alternate, simple or palmately compound (**A**), with palmate venation (rarely pinnate)
- With stipules that fall off early
- Flowers actinomorphic, 5-merous, often with an epicalyx (extra calyx outside normal calyx; **B**)
- Petals free, 5 (**C**), often convolute in bud
- Stamens 5-many, often fused in a tube around the style or as separate bundles
- Ovary usually superior, 2-many carpels
- Fruit usually a capsule or a wheel-shaped schizocarp (**D**)

Note: This family now includes the mainly tropical families Bombacaceae and Sterculiaceae, as well as the tree family Tiliaceae. The characters listed here works best for temperate herbaceous Malvaceae.

Examples: Cotton (*Gossypium*), hibiscus (*Hibiscus*), mallow (*Malva*), marshmallow (*Althaea*), linden, basswood (*Tilia*), cacao (*Theobroma*), kapok (*Ceiba*), jute (*Corchorus*), cola (*Cola*), okra (*Abelmoschus*), durian (*Durian*), balsa wood (*Ochroma*), baobab (*Adansonia*).

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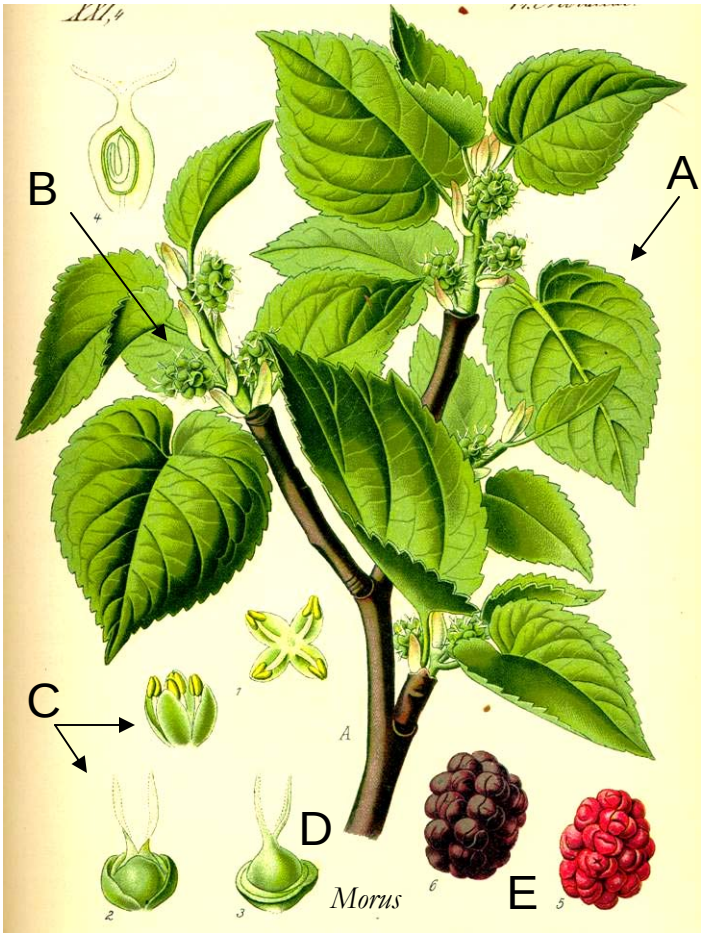
Moraceae MULBERRY FAMILY



- Trees, shrubs, or herbs
- Monoecious or dioecious
- Often with latex (milky sap)
- Leaves simple, with stipules (**A**)
- Inflorescence axillary (head, catkin (**B**), spike, raceme, or flattened or urn-shaped receptacle)
- Flowers unisexual, very small (**C**)
- Sepals 0-10, fused at least at base
- Petals absent (**D**)
- Stamens 1-6
- Styles 2 (**D**)
- Fruit is a multiple of many 1-seeded achenes (nutlets; **E**), sometimes in/on a fleshy perianth or receptacle

Examples: mulberry (*Morus*), fig /banyan trees (*Ficus*), breadfruit/jackfruit (*Artocarpus*), osage-orange (*Maclura*).

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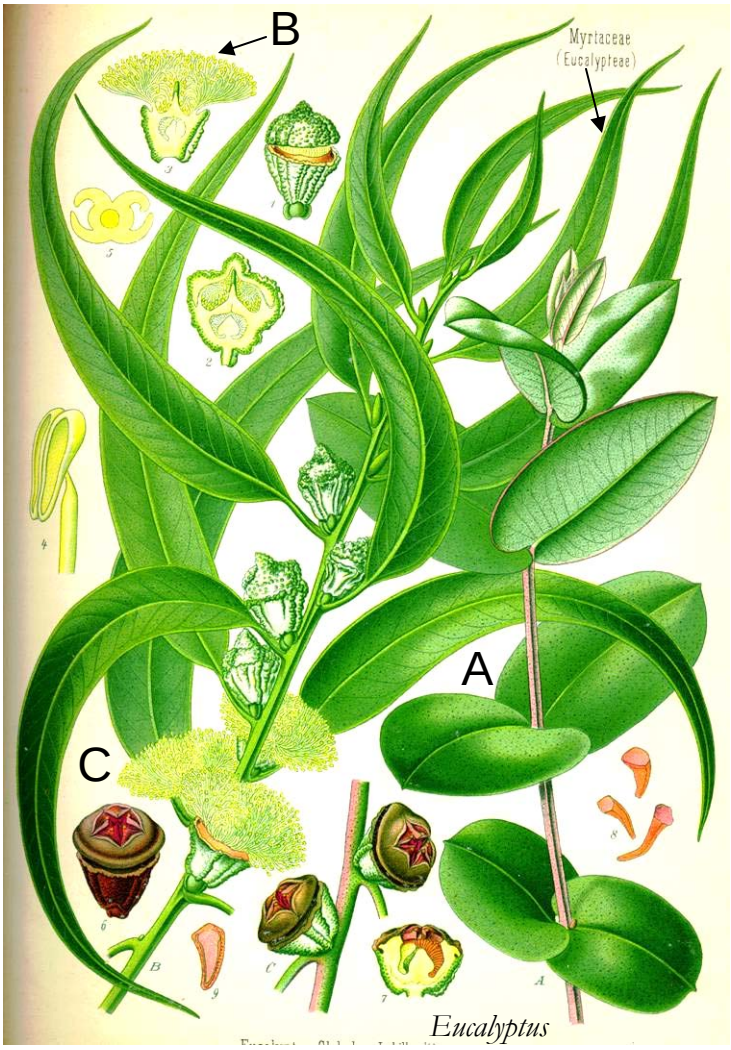
Myrtaceae MYRTLE FAMILY

- Trees and shrubs
- Leaves and stems with oil glands, very aromatic
- Leaves opposite or alternate, simple, sometimes leathery (**A**)
- Flowers actinomorphic, with hypanthium
- Sepals and petals 4-5
- Stamens many, free or fused into a few bundles, often the showy part of the flower (**B**)
- Nectary disk on top of ovary or inside flower
- Ovary syncarpous, inferior, placentation axile
- Fruit a capsule (**C**) or fleshy



Examples: eucalyptus (*Eucalyptus*), cloves (*Syzygium*), bottlebrush (*Callistemon*), tea tree (*Leptospemum*), myrtle (*Myrtus*), guava (*Psidium*), allspice (*Pimenta*).

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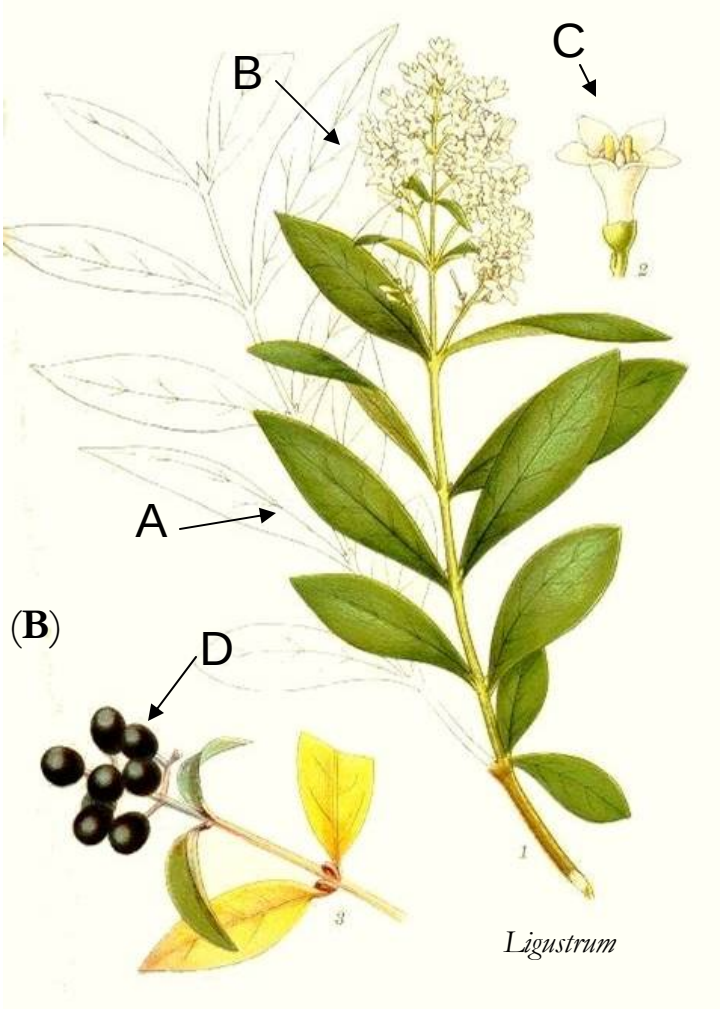
Oleaceae OLIVE and JASMINE FAMILY



- Trees and shrubs (vines)
- No latex
- Leaves opposite, simple or compound, no stipules (**A**)
- Inflorescence a panicle or raceme (**B**)
- Flowers actinomorphic
- Sepals and petals 4, fused (**C**) (reduced in wind-pollinated species)
- Stamens 2 (**C**)
- Ovary 2-carpellate, superior, 2 ovules in each locule
- Fruit a drupe, berry (**D**), capsule or samara

Examples: golden bells (*Forsythia*), olive (*Olea*), jasmine (*Jasminum*), ash (*Fraxinus*), fringe tree (*Chionanthus*), privet (*Ligustrum*), lilac (*Syringa*), osmanthus (*Osmanthus*).

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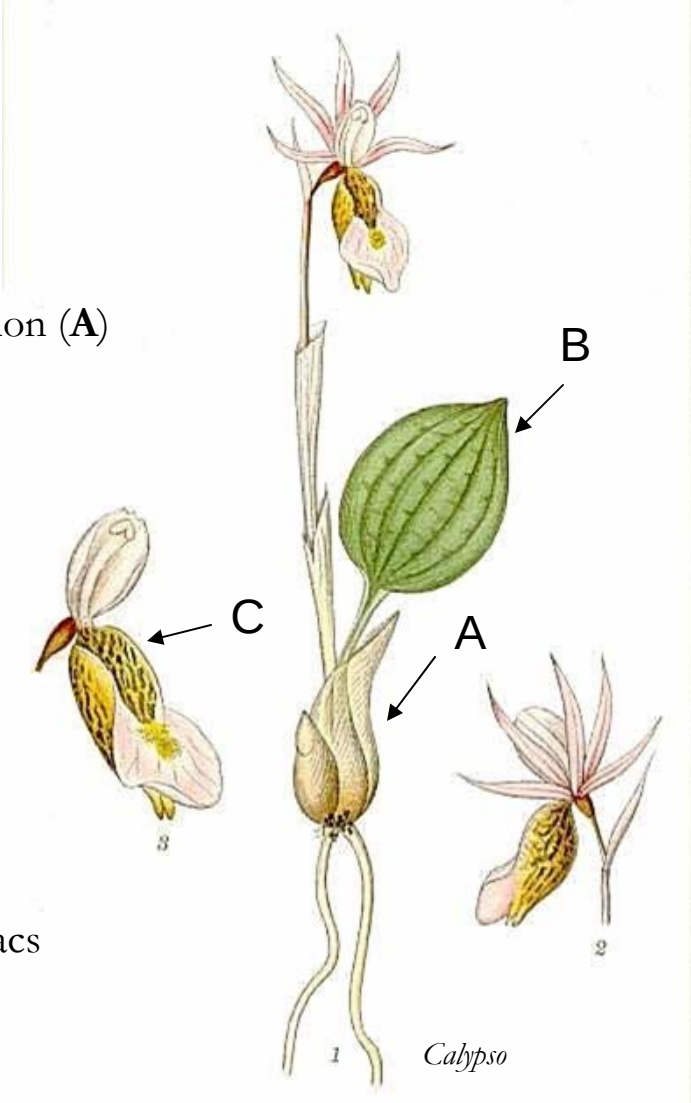
Orchidaceae ORCHID FAMILY



- Herbs, terrestrial or epiphytes
- Tubers, corms and rhizomes common (**A**)
- Epiphytic species with air roots (with white velamen)
- Leaves alternate or whorled, often sheathing at base, simple, with parallel venation (**B**)
- Inflorescence a raceme, spike, or solitary flower
- Flowers zygomorphic (**C**)
- Tepals 3+3, free, lower tepal often enlarged into a lower lip (labellum, **C**), some with spurs or sacs
- Stamen 1, fused with style and stigma into a gynostegium/column
- Pollen spread as pollinia
- Ovary inferior, 3-carpellate, inside 180 degree twisted flower stalk (resupinate)
- Fruit a capsule, with many dust-sized seeds

Note: some of the advanced floral characters are missing in subfamilies Cypripedioideae and Apostasioideae.

Examples: vanilla (*Vanilla*), cattleya (*Cattleya*), dendrobium (*Dendrobium*), boat orchid (*Cymbidium*), epidendrum (*Epidendrum*), slipper orchid (*Cypripedium*, *Paphiopedilum*), moth orchid (*Phalaneopsis*).

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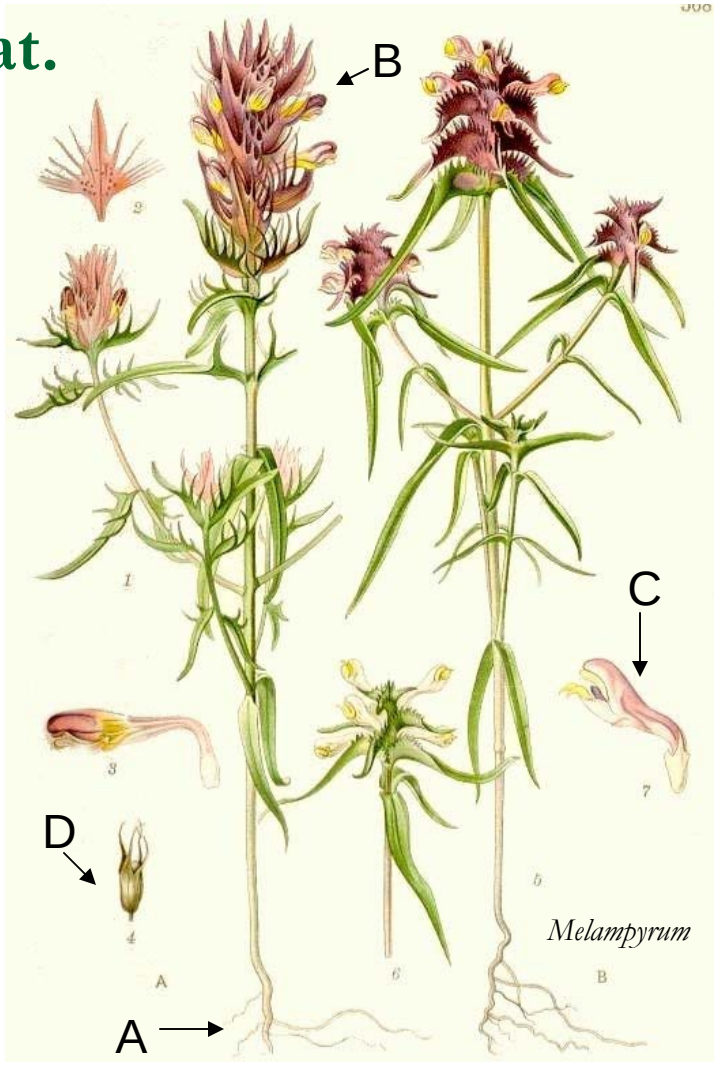
Orobanchaceae s. lat. BROOM-RAPE FAMILY



- Fully or partial root parasites on other plants, sometimes without chlorophyll (then white, brown, purple, red or pink)
- Root system small (A) or haustoria
- Herbs or rarely shrubs
- Leaves opposite or alternate, simple, sometimes scale-like
- Inflorescences often with colored bracts (**B**), as racemes, spikes (**B**) or solitary flowers
- Petals 5, fused, 2-lipped (3 lobes on lower lip; **C**)
- Stamens 4, 2 long and 2 short
- Ovary superior, 2-carpellate
- Fruit a capsule (**D**), 1-locular, with many tiny seeds

Note: Several genera have recently been moved from Scrophulariaceae into Orobanchaceae.

Examples: broom-rape (*Orobanche*), Indian paintbrush (*Castilleja*), beech drops (*Epiphagus*), lousewort (*Pedicularis*), cow-wheat (*Melampyrum*), eyebright (*Euphrasia*), false foxglove (*Agalinis*).

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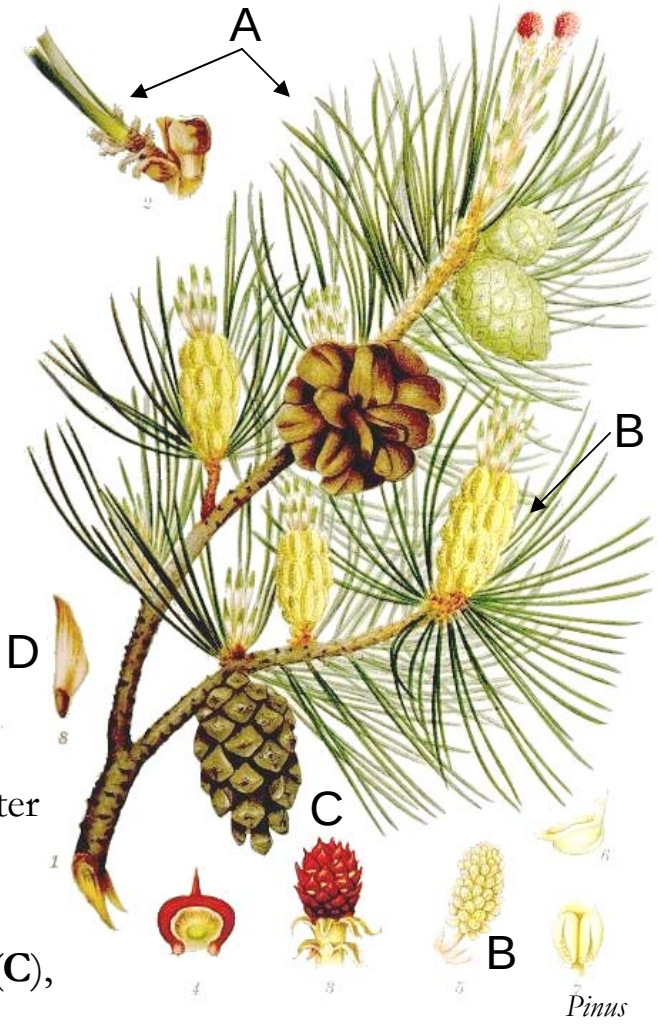
Pinaceae
PINE FAMILY



- Monoecious trees (rarely shrubs)
- Usually evergreen
- Bark not falling off in long strips
- Resinous, fragrant
- Leaves as linear needles, sometimes flattened, 1-10 in fascicles on branches, spirally arranged (**A**)
- Male cones smaller (**B**), fall off after releasing pollen, wind-pollinated
- Female cones large, with woody and spirally arranged cone scales (**C**), maturing over several years, each scale with 2 winged seeds (**D**)

Examples: pine (*Pinus*), spruce (*Picea*), larch (*Larix*), douglas fir (*Pseudotsuga*), fir (*Abies*), cedar (*Cedrus*), hemlock (*Tsuga*).

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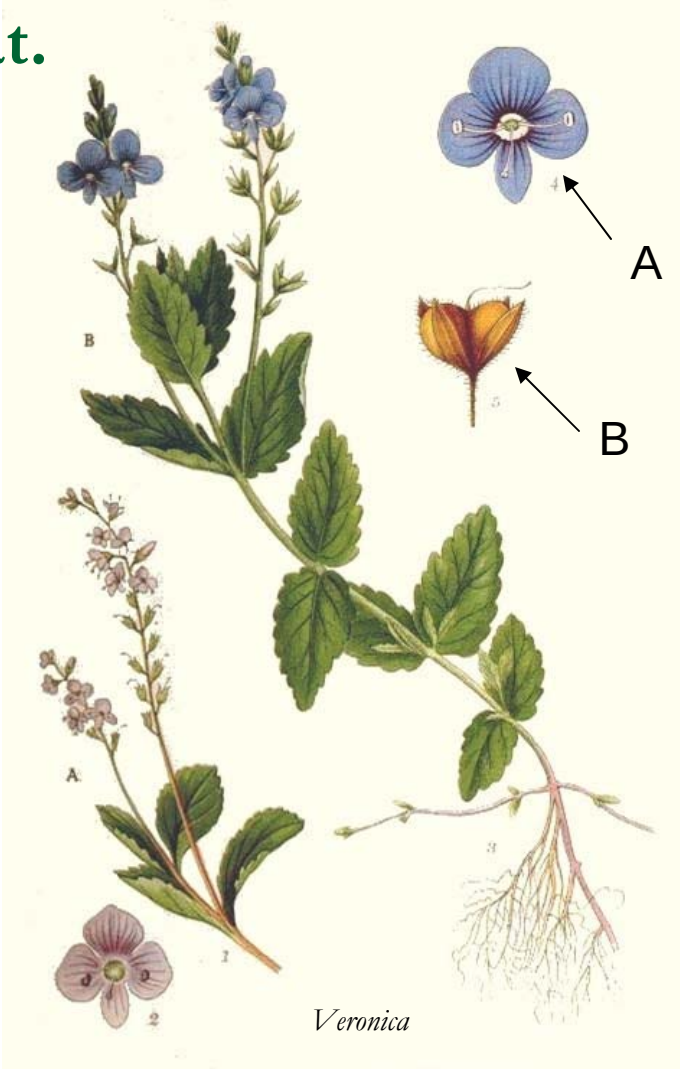
Plantaginaceae s. lat. PLANTAIN FAMILY

- Herbaceous (rarely shrubs)
- Hairy plants, often aromatic
- Leaves alternate or opposite
- Flowers bilateral (**A**, often 2-lipped)
- Stamens 4, 2+2 together (**A**)
- Ovary superior (**B**)
- Seeds attached to center of fruit (axile placentation)
- Fruit a dry capsule (**B**)
- Seeds numerous



Note: Many species in this family previously belonged to Scrophulariaceae. Callitrichaceae and Globulariaceae are also included in Plantaginaceae.

Examples: plaintain (*Plantago*), speedwell (*Veronica*), snapdragon (*Antirrhinum*), foxglove (*Digitalis*), turtlehead (*Chelone*), chinese house (*Collinsia*), butter-and-eggs, toad flax (*Linaria*), beard tongue (*Penstemon*).

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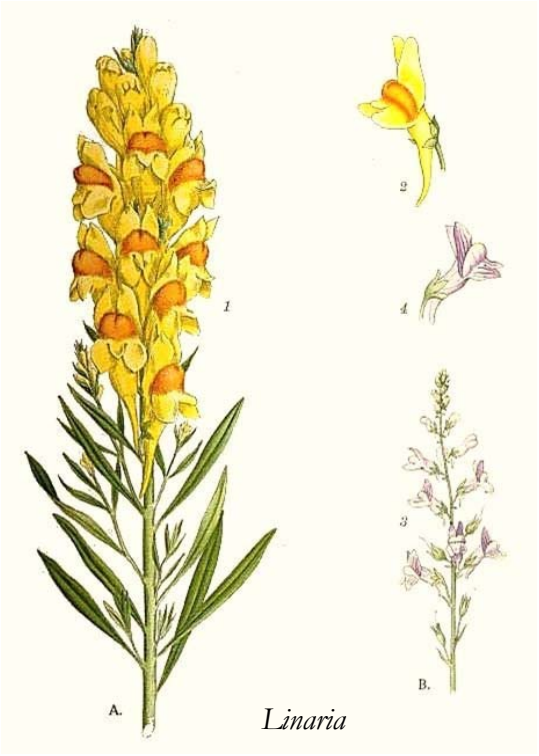
Plantaginaceae PLANTAIN FAMILY



Linaria

Digitalis

Plantago

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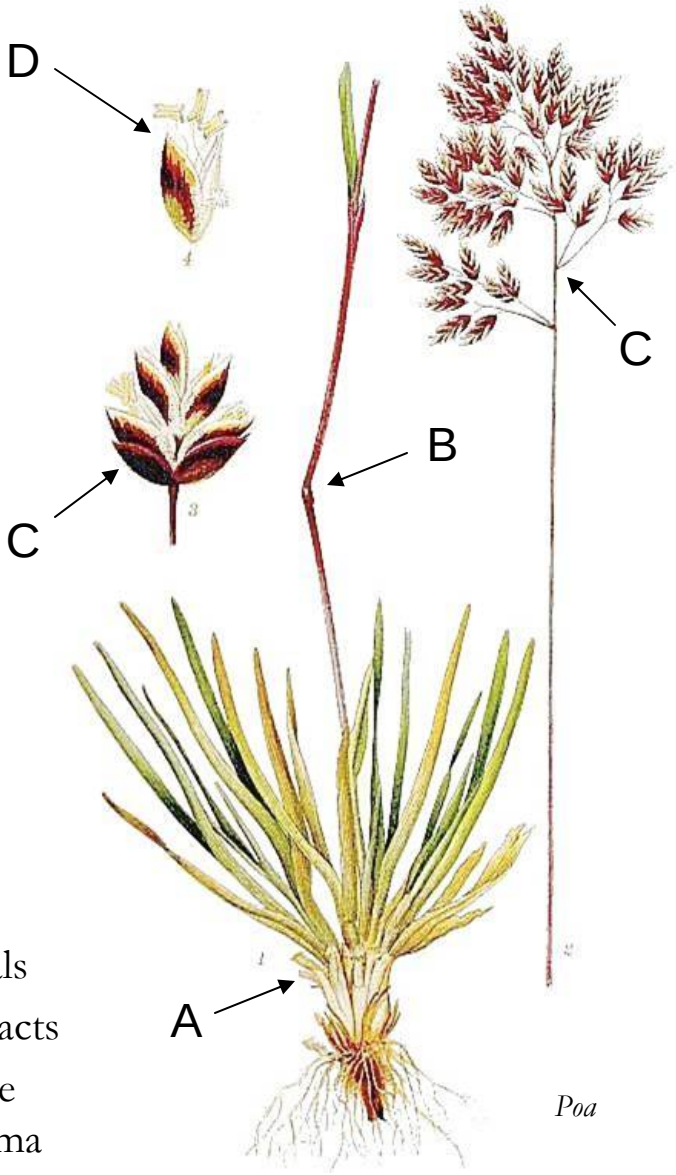
Poaceae GRASS FAMILY



Poa

- Herbaceous or seldom woody
- Stems often rhizomatous and/or with erect culms (**A**, shoots)
- Stems round, hollow, with nodes (**B**)
- Leaves linear, with parallel venation, sheathing, with ligule at top of sheath
- Inflorescences with terminal and axillary spikelets (**C**), subtended by bracts (glumes)
- Flowers without sepals and petals
- Spike (awn) often present on bracts
- Stamens and ovary hidden inside bracts (**D**), called palea and lemma
- When flowering, styles and anthers hanging out from spikelets
- Stamens 3
- Style often branched and plumose (feather-like)
- Fruit a one-seeded nut (caryopsis)

Examples: corn/maize (*Zea*), wheat (*Triticum*), barley (*Hordeum*), rye (*Secale*), oats (*Avena*), rice (*Oryza*), bamboo (many genera), bluegrass (*Poa*), reed (*Phragmites*), sugarcane (*Saccharum*), fescue (*Festuca*), bentgrass (*Agrostis*).

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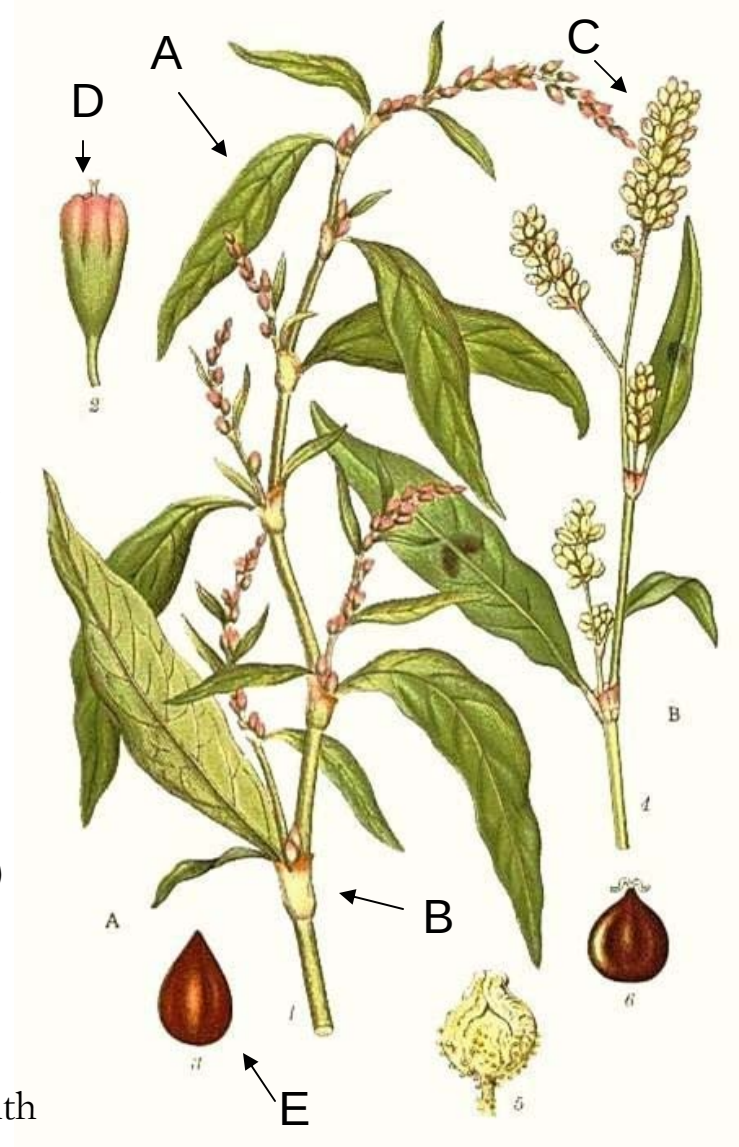
Polygonaceae BUCKWHEAT FAMILY

- Herbs or shrubs, sometimes vines or trees
- Stems with swollen nodes
- Leaves alternate, simple (**A**), often with stipular sheath surrounding the stem at base of leaf (ocrea, **B**)
- Inflorescences in fascicles arranged in spikes or racemes (**C**)
- Flowers small, often pinkish or greenish (**D**)
- Tepals 3+3 or 5, fused at base (**D**)
- Stamens often with nectaries at their base
- Ovary superior
- Fruit a 3-sided achene or nutlet with a single seed (**E**)



Polygonum

Examples: rhubarb (*Rheum*), buckwheat (*Fagopyrum*), smartweed, knotweed, pinkweek, persicaria (*Polygonum*, *Persicaria*, *Fallopia*), sorrel (*Rumex*).

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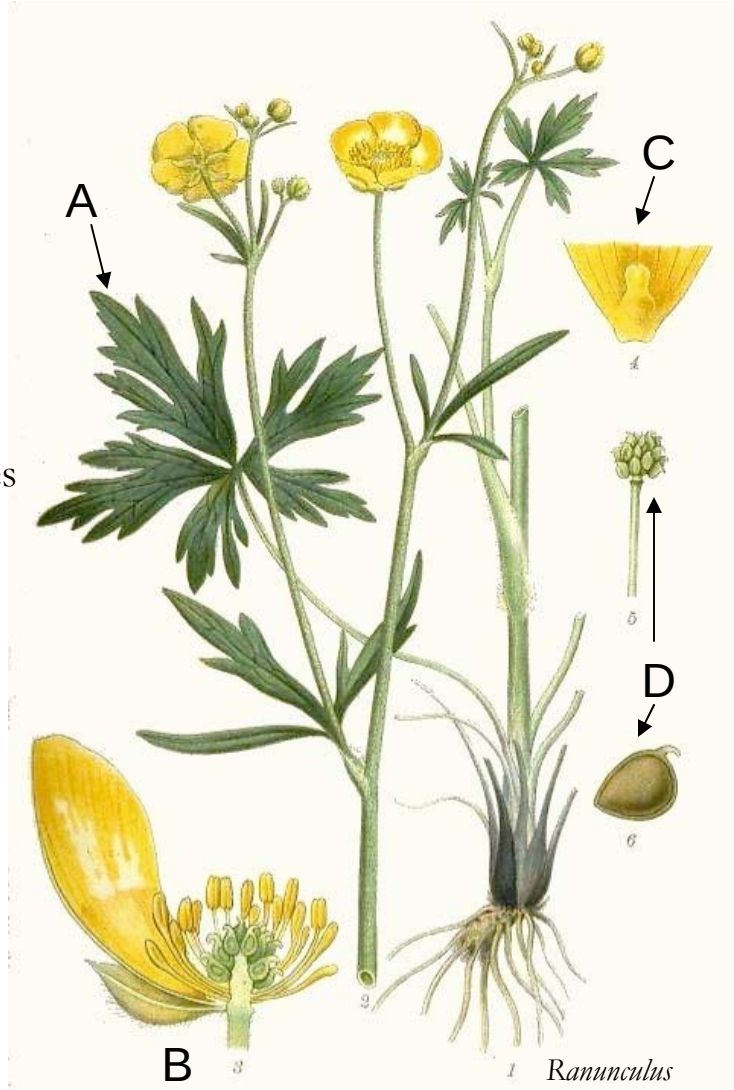
Ranunculaceae BUTTERCUP FAMILY



- Herbs, lianas or shrubs
- Leaves alternate, simple or compound (**A**), often lobed or dissected, with or without stipules
- Inflorescence a cyme or flowers single
- Flowers with spirally arranged parts (**B**)
- Sepals often petal-like, free
- Petals free, few to many, often with nectaries (**C**) on inside base and/or spurred
- Stamens many (**B**)
- Gynoecium with few-many carpels, separate (apocarpous), superior (**B**)
- Fruit a follicle, achene (**D**) or berry (often aggregated from several carpels)

Examples: buttercup (*Ranunculus*), anemone, windflower (*Anemone*), pasque flower (*Pulsatilla*), clematis (*Clematis*), meadow rue (*Thalictrum*), baneberry, bugbane, cohosh (*Actaea*), monkshood, wolfsbane (*Aconitum*), marsh marigold (*Caltha*), columbine (*Aquilegia*), love-in-a-mist (*Nigella*), hepatica (*Hepatica*), larkspur (*Delphinium*), hellebore (*Helleborus*), goldenseal (*Hydrastis*).

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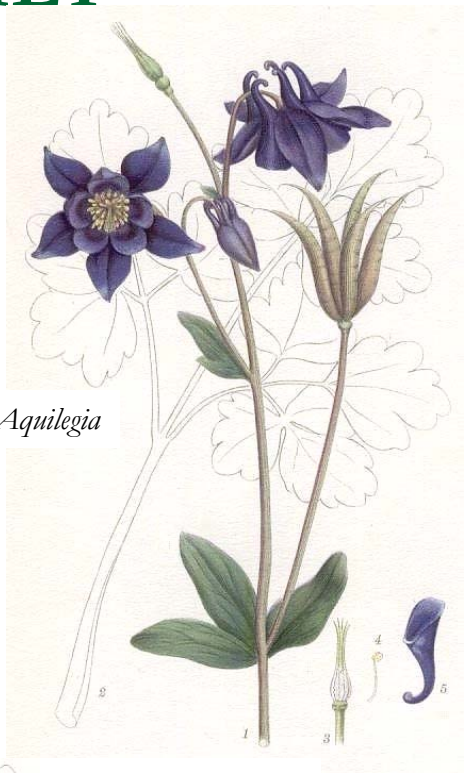
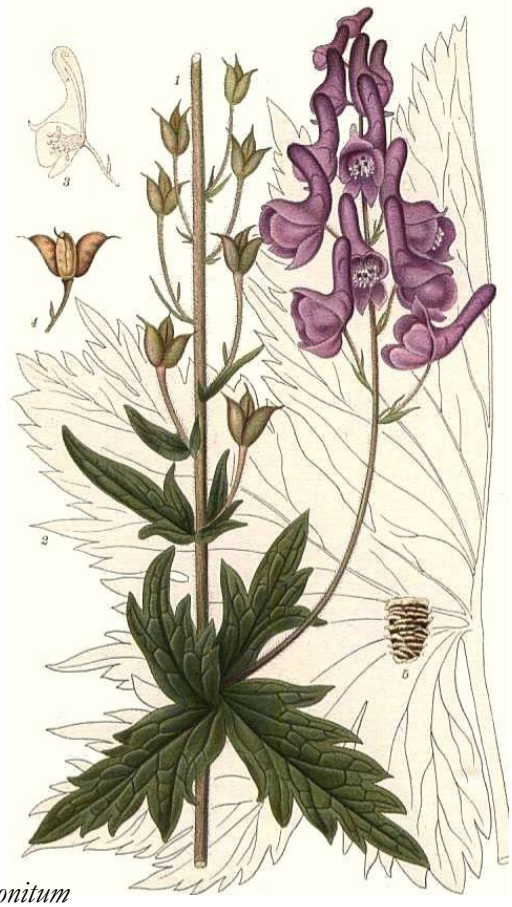
Ranunculaceae BUTTERCUP FAMILY



Aquilegia

Actaea

Anemone



Aconitum

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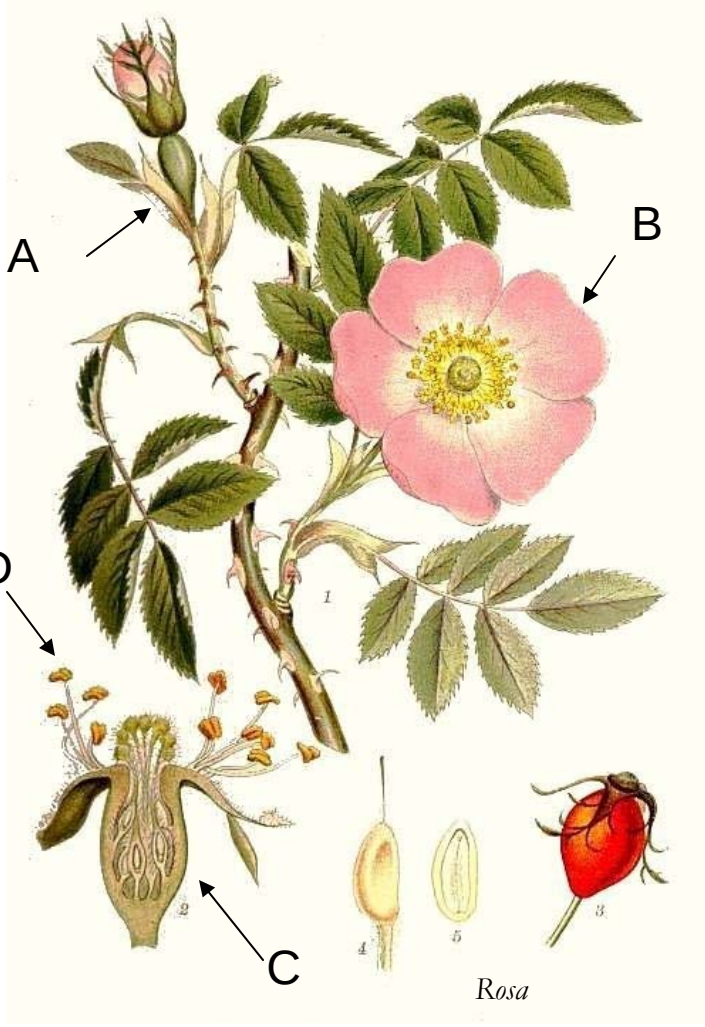
Rosaceae ROSE & APPLE FAMILY

- Herbaceous or woody, often shrubs or trees
- Stipules (**A**) at base of each leaf
- Sepals 5, petals 5 (**B**), free
- Hypanthium (**C**, cup-like structure composed from the fused petal, sepal, and stamen bases)
- Stamens usually numerous (**D**)
- Fruit type variable, often pome (apple-like), drupelets (blackberry-like), drupe (stone fruit), dry capsules, or dry nutlets



Examples: Rose (*Rosa*), apple (*Malus*), pear (*Pyrus*), blackberry /raspberry (*Rubus*), Lady's mantle (*Alchemilla*), hawthorn (*Crataegeus*), strawberries (*Fragaria*), plum/almond/peach/apricot (*Prunus*), spiraea (*Spiraea*)

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Rosaceae ROSE & APPLE FAMILY

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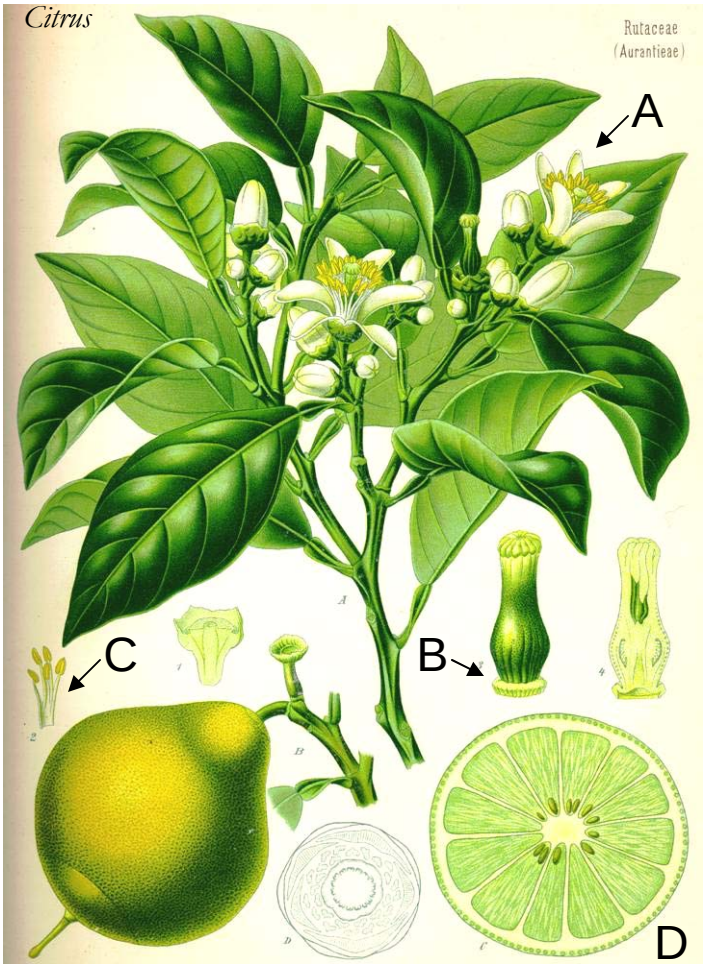
Rutaceae
RUE or CITRUS FAMILY



- Trees, shrubs, lianas (herbs), sometimes with thorns
- Leaves alternate, simple or compound, no stipules
- Leaves often with oil glands as small dots inside leaves (fragrant)
- Flowers actinomorphic (**A**)
- Sepals 4-5, free or fused
- Petals 4-5, free or fused
- Nectary disk inside flower below ovary and stamens (**B**)
- Stamens 8-many, often in groups, sometimes fused (**C**)
- Ovary superior, 4-many fused carpels, axile placentation (**D**)
- Fruit a berry, drupe, schizocarp or hesperidium (**D**, juicy part is swollen hairs); fruit wall often with oil glands

Examples: lemon, lime, grape fruit, orange, mandarine, kumquat (*Citrus*), rue (*Ruta*), prickly-ash (*Zanthoxylum*).

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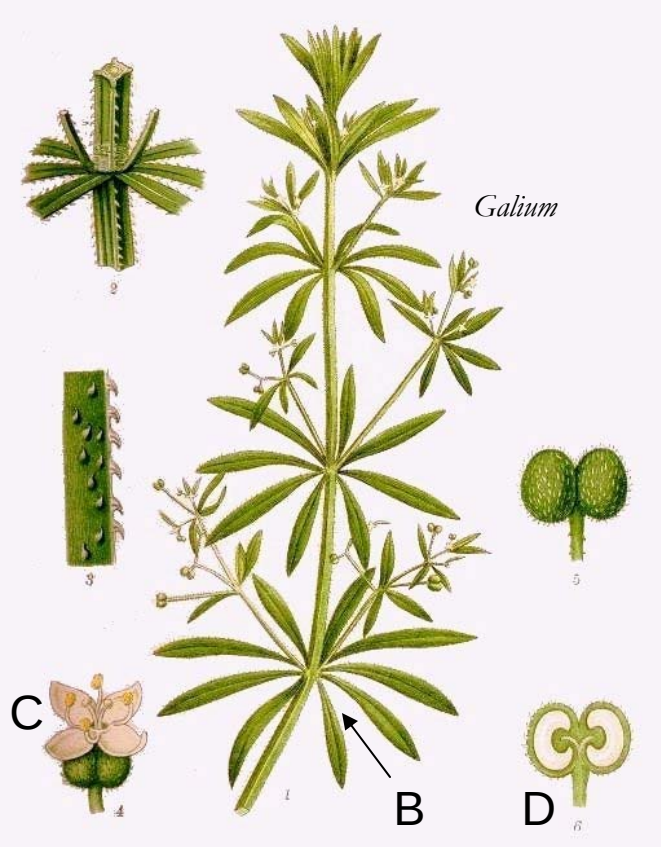
Rubiaceae COFFEE FAMILY

- Herbs, shrubs, or trees
- Leaves opposite, simple with entire margin (**A**)
- With interpetiolar stipules (or stipules leaf-like to resemble whorled leaves, **B**)
- Inflorescence cymose, or flowers solitary
- Flowers actinomorphic (**C**)
- Sepals (0)4-5, fused at base
- Petals 4-5, fused, corolla often trumpetshaped
- Stamens 4-5, inserted into corolla wall, as many as petals
- Ovary inferior, usually 2-carpellate, placentation axile (**D**)
- Fruit a capsule, drupe, berry, or schizocarp, sometimes aggregate

Examples: bedstraw, madder (*Galium*, *Rubia*), quinine tree (*Cinchona*), coffee (*Coffea*), yohimbine (*Pausinystalia*), buttonbush (*Cephalanthus*), West Indian jasmine (*Ixora*), morinda, noni (*Morinda*), pentas (*Pentas*), Ipecacuanha (*Psychotria*).



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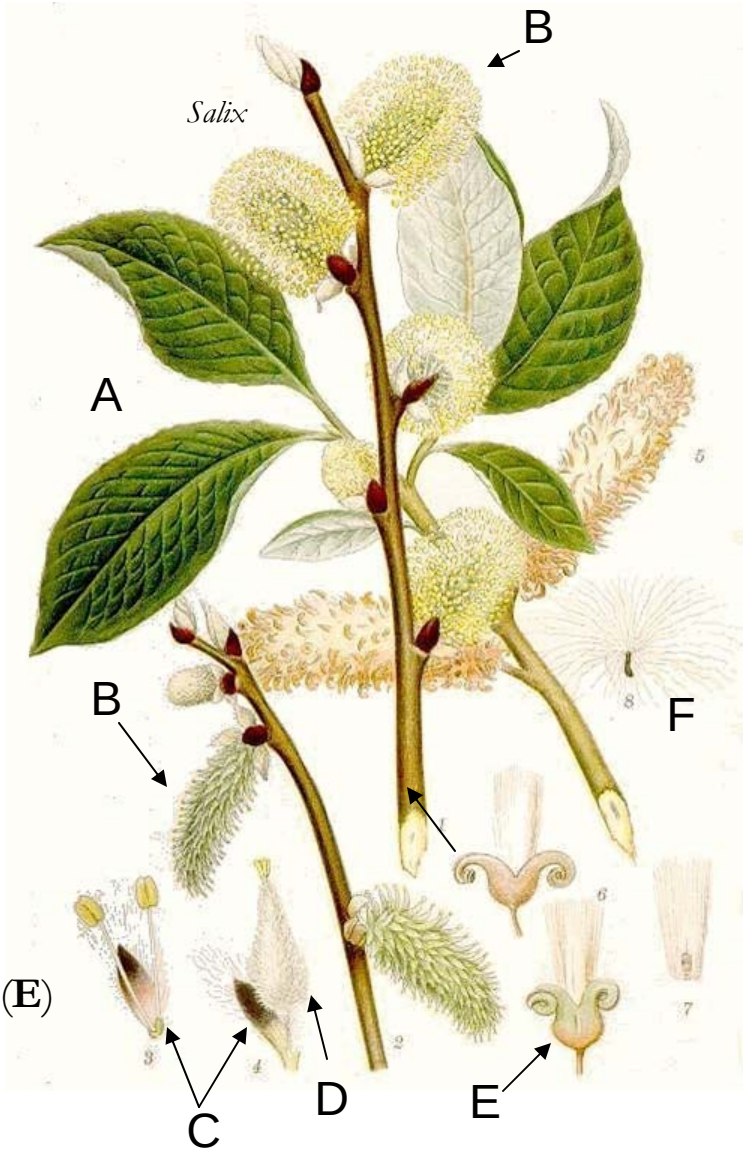
Salicaceae s. str. WILLOW FAMILY

- Trees or shrubs, dioecious
- Leaves deciduous, simple, alternate (**A**)
- With or without stipules
- Inflorescences as unisexual catkins (**B**)
- Each flower with a bract below (**C**)
- Sepals and petals absent (**C**)
- Each flower with nectaries
- Ovary from 2 fused carpels, style very short (**D**)
- Fruit a capsule with many seeds (**E**)
- Seeds with long hairs (**F**) (wind-dispersed)



Note: Flacourtiaceae was recently included in Salicaceae. The field characters listed here work mostly for Salicaceae in its older, more restricted sense.

Examples: willow (*Salix*), poplar, cottonwood, aspen (*Populus*).

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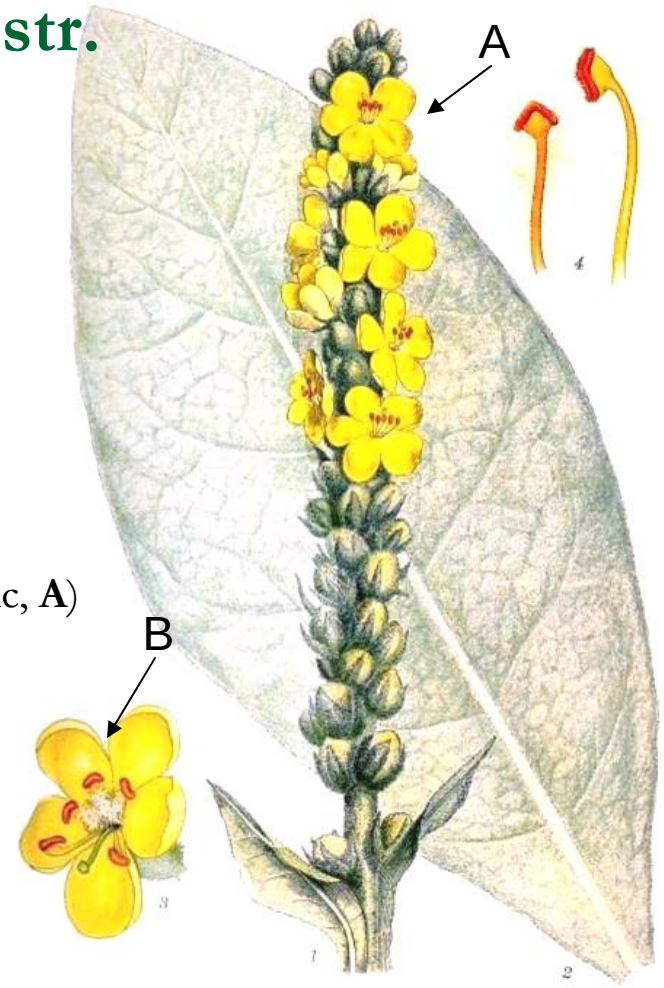
Scrophulariaceae s. str. MULLEIN and FIGWORT FAMILY

- Herbs, never parasitic
- Stem not angular
- Leaves alternate or opposite
- Flowers usually at least slightly zygomorphic (rarely actinomorphic, **A**)
- Sepals 5, fused at base
- Petals 5, fused at least at base (**B**)
- Stamens 2 or 4 (rarely 5), inserted into corolla tube (**B**)
- Ovary superior, 2 fused carpels
- Fruit a capsule with many seeds



Verbascum

Note: Many genera of 'old' Schrophulariaceae were recently moved out of the family into Plantaginaceae, Orobanchaceae. The characters listed here are for the new version of the family, and unfortunately there aren't many good field characters to identify Scrophulariaceae s. str.

Examples: figwort (*Schrophularia*), mullein (*Verbascum*), butterfly bush (*Buddleja*), mudworts (*Limosella*).

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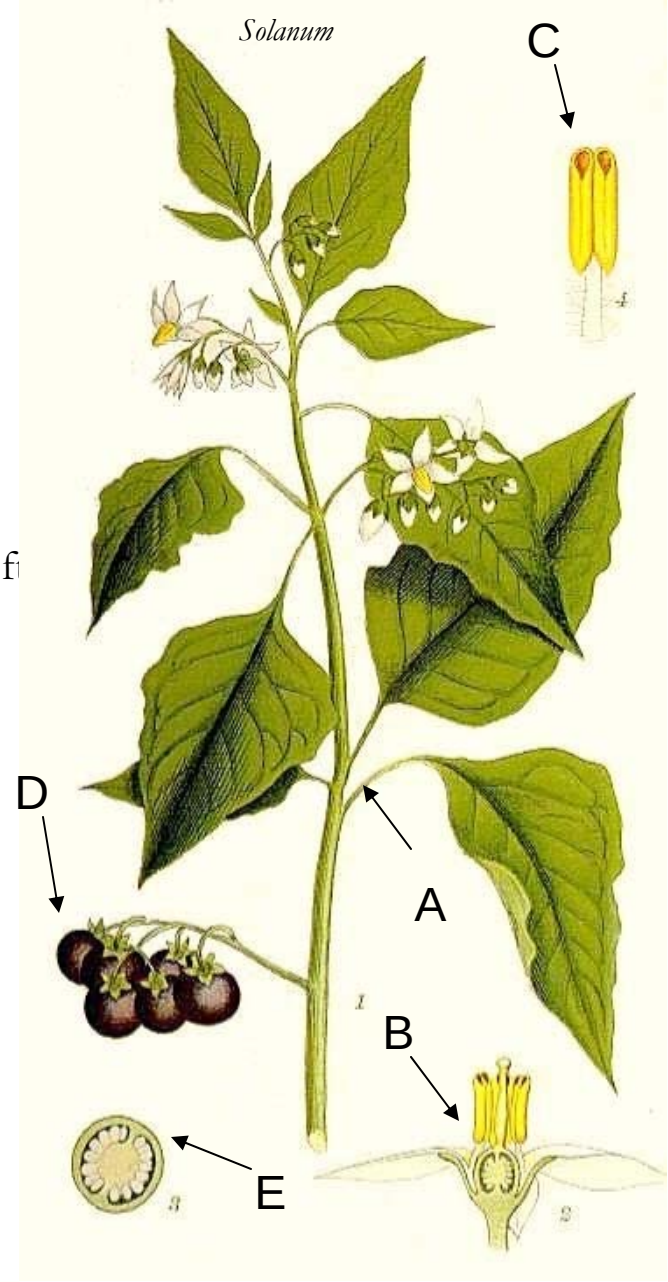
Solanaceae TOMATO, PEPPER, & POTATO FAMILY



- Herbaceous in temperate areas, often woody in tropics
- Leaves alternate (**A**), often lobed, of hairy, sometimes with prickles
- Stipules absent (**A**)
- Sepals 5, fused
- Petals 5, fused a little or a lot, corolla star-, trumpet-, or funnel-shaped or tubular
- Ovary superior (**B**)
- Anthers often fused, porate (**C**) (peppershaker-type)
- Berry (**D**), drupe, or capsule
- Seeds many, attached to center of fruit (axile placentation, **E**)

Examples: potato/tomato (*Solanum,* incl. *Lycopersicon*), chili pepper/sweet pepper (*Capsicum*), angel trumpet (*Brugmansia*), tobacco (*Nicotiana*), petunia (*Petunia*), tomatillo (*Physalis*), jimsonweed (*Datura*).

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Resources

BOOKS and WEBSITES

- **Plant Systematics** by Michael G. Simpson. Elsevier Academic Press. Excellent textbook for introduction to morphology, classification and evolution of plants, many color photos.
- **USDA PLANTS** website. All native species in the USA are listed, many with photos and maps. http://plants.usda.gov/

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